PCE

PILLAI COLLEGE OF ENGINEERING

AUTONOMOUS

DEPARTMENT JOURNAL

Electronics and Telecommunication Engineering

ELECTRONICS

JAN 2024

FROM PRINCIPAL'S DESK

I'm delighted to acknowledge the significant contribution of both the faculty and students in the Electronics and Telecommunication department for collaboratively creating a groundbreaking journal. This publication stands out as an impressive showcase of diverse technological advancements in electronics and telecommunication.

In today's rapidly evolving engineering landscape, continuous discovery and advancement are paramount, demanding the highest levels of imagination. To achieve meaningful goals, the current generation needs to find new and creative approaches to learning. I'm committed to providing an environment that supports both academic and creative learning opportunities for our students.

The journal has surpassed my expectations, reflecting the dedication and talent within the department. I extend my best wishes to the staff and students, hoping for continued success in their future endeavors.

Dr. Sandeep Joshi
Principal
Pillai College of Engineering

FROM HEAD OF THE DEPARTMENT'S DESK

Promoting a culture of continuous learning is a hallmark of Pillai College of Engineering. It fills me with great pride as the Electronics and Telecommunication department releases this latest issue of our department journal. The insightful content provided gives us a deep dive into the diverse interests within our department, showcasing the creative potential and originality of both our students and faculty.

I extend my heartfelt appreciation to the students for their exceptional dedication and outstanding work. Their ability to create remarkable projects while maintaining a focus on cost-effectiveness reflects a crucial aspect of sustainable initiatives.

The papers submitted to the journal serve as a testament to the students' dedication and efforts. I commend the journal committee for ensuring that the earnest work of our students is both noticeable and widely appreciated throughout the college through the publication of the journal. As our students embark on various paths in life, I hope they continue to discover innovative approaches.

Wishing all the students the very best in their future pursuits.

Dr. Avinash Vaidya
Head Of Department
Electronics and Telecommunication Engineering

FROM TEACHER'S DESK

The annual journal of the Electronics and Telecommunication department serves as a showcase for our students' proposals, providing a platform for their ideas to be presented to the entire campus. The papers written by students become a valuable repository of knowledge for others to explore. The Journal committee deserves immense appreciation for their tremendous efforts. Not only did they plan and organize the reports, but they also assisted students in the article-writing process. Their commendable punctuality in completing the work is noteworthy. The technical papers submitted this year reflect the creativity in our students' thinking, indicating a promising future.

I extend my best wishes to the committee and eagerly anticipate more outstanding issues of this journal in the future.

Prof.Jayashri Bhosale
Assistant Professor
Electronics and Telecommunication Engineering

VISION AND MISSION

INSTITUTE VISION :

Pillai College of Engineering (PCE) will admit, educate and train in technology, a diverse population of students who are academically prepared to benefit from the Institute's infrastructure and faculty experience, to become responsible professionals. It will further attract, develop and retain, dedicated, excellent teachers, scholars, scientists and professionals from diverse backgrounds whose work gives them visibility beyond the classroom and who are committed to making a significant impact in the lives of their students and the community.

INSTITUTE MISSION :

To develop professional engineers with respect for the environment and to make them responsible citizens, both from a local and global perspective. This objective is fulfilled through quality education, practical training, research, entrepreneurship and interaction with industries and social organizations.

DEPARTMENT VISION :

Strive towards producing world class engineers who will continuously innovate, upgrade telecommunication technology and provide advanced, hazard-free solutions to the mankind.
Inspire, educate and empower students to ensure green and sustainable society.

DEPARTMENT MISSION :

Benchmarking against technologically sound global telecommunication institutions with a view towards continuous improvement.
Continually exposing students to scenarios that demand structuring of complex problems and proposing solutions.
Educate students and promote values that can prevent further degradation of our planet. Becoming responsible citizens genuinely concerned with and capable of contributing to a just and peaceful world.

INSTITUTAL OBJECTIVE

To evolve a teaching-learning process where by students have freedom of thought and thereby explore the various aspects of technological development.
To encourage the teaching faculty to pursue research in specialized and emerging areas of technology and develop their skills to impart that knowledge to students.
To provide the requisite infrastructure including workshops, Library and IT laboratories to create a learning environment.
To promote the interaction of students and faculty with the industry.
To collaborate with other leading institutions in India and overseas to gain improvement for the lives of all global citizens.

DEPARTMENT OBJECTIVE & OUTCOME

PROGRAM EDUCATIONAL OBJECTIVE :

Provide graduates with a strong foundation in mathematics, science and engineering fundamentals to enable them to analyze and solve challenging problems in Electronics and Telecommunication Engineering.
Impart analytic and thinking skills to develop innovative ideas in the field of Telecommunication Engineering.
To keep students up to date with the latest advancement in the field of Electronics and Telecommunication
Inculcate qualities of leadership skills, multi-disciplinary team work and an ability to adapt to evolving professional environment in the field of Engineering and Technology.
To create awareness among the students towards ethical, social and environmental issues in the professional career.

PROGRAM SPECIFIC OUTCOMES :

Able to understand the concept of Basic Electronics, Network and Circuit Analysis, Analog and Digital circuits, Signals and System, Electro magnetics and apply them in various areas like Microwave Engineering, Wireless Communication, Digital image processing, Advance Communication systems etc.
Able to use techniques, skills, software, equipments and modern engineering tools necessary for Electronics and Telecommunication Engineers to identify, formulate and solve problems in industries and research work.
Able to work in multi disciplinary environment to provide socially acceptable technical solutions for complex communication engineering problems.

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Drunk Driving Alert System With Ignition Lock

Katkar Hrishikesh Sunil, Jadhav Shubham Dada, Mishra Akash Narayan, Naik Shreya Rajendra,
Prof. Sweta Waghmare,

Abstract*—Drunk driving remains a critical global concern, contributing significantly to road accidents and fatalities. To address this issue, a Drunk Driving Alert System with an Ignition Lock (DDASIL) is proposed. The DDASIL combines innovative sensor technology, real-time data analysis, and ignition control to prevent intoxicated individuals from operating a motor vehicle. This abstract tell us about the development and deployment of this project. The system integrates components, such as an MQ3 sensor(use for alcohol detection), GSM/GPS module for sending message/tracking locations in order to continuously monitor the driver's sobriety. Data from these sensors is processed in real time by a central control unit. If the system detects impairment beyond predetermined thresholds, the ignition lock is engaged, preventing the vehicle from starting. This project outlines the technological and social aspects of DDASIL, focusing on its potential to reduce drunk driving incidents, save lives, and decrease the associated social and economic costs. Additionally, it highlights challenges such as privacy concerns and legal implications that may arise from the implementation of such a system. The DDASIL represents a crucial step forward in enhancing road safety by providing an effective, technology-driven solution to combat drunk driving. The integration of cutting-edge sensors and ignition control mechanisms holds promise in preventing accidents and fatalities resulting from impaired driving, thereby making our roads safer for all.

Keywords— Alcohol, Detection, Lock, Engine, Messages , Location

I. Introduction

1.1Fundamentals

1The Drunk Driving Alert System is a project that can significantly contribute to road safety. It provides an efficient and practical solution for preventing drunk driving by disabling the ignition system of a vehicle. This project can be implemented in any vehicle, making it an effective tool for combating drunk driving worldwide.

2)Sensors: The main component of DDASIL is its sensor technology, which includes such MQ3 sensor that is use for alcohol detection.

3)Thresholds: DDASIL defines specific thresholds for MQ3 sensor to determine when a driver is considered drunk or not. For example, if the driver has drunk below the limit then the system will not interrupt his/her driving but if it is above the permissible limit then it will trigger the ignition system and the engine will be locked.

a)Ignition Lock: When the system determines that the driver is impaired beyond the established thresholds, it engages the ignition lock. This prevents the vehicle from starting and acts as a safety measure to discourage drunk driving.

b)Safety Focus: The primary objective of DDASIL is to enhance road safety by keeping intoxicated individuals from operating a motor vehicle, thus reducing the risk of accidents, injuries, and fatalities.

c)Social and Economic Impact: Reducing drunk driving incidents through the DDASIL system can lead to significant social and economic benefits, including fewer accidents, lower healthcare costs, and improved road safety overall.
d)Future Development: As technology advances, DDASIL may evolve to incorporate additional features and improve accuracy. Future developments may include enhanced sensors and more seamless integration with vehicles.

1.2 Objective

a)To design a system that can detect the alcohol concentration in the driver's breath to prevent the behavior of drunk driving. Detecting drunk driving requires stopping vehicles and manually scanning drivers by using breath analyzers. Over here it proposes a system that allows to detection drunk driving in the vehicle itself.

b)The system uses an alcohol sensor with Raspberry Pi along with a Global System for Mobile (GSM) modem for Short Messaging Service (SMS) notification, Global Positioning System (GPS) to detect the location of the car, Liquid Crystal Display (LCD) and a DC motor to demonstrate as vehicle motor. Now the system constantly checks for drivers' breath for alcohol content.

c)The system is initialized after storing two phone numbers in the memory of Raspberry Pi. It is done by calling the GSM module from the two desired numbers.

d)The two numbers are named as Admin and Department of Motor and Vehicle (DMV). Once it is initialized the motor or engine starts and the system starts checking the alcohol content in the driver's breath. If the system detects that the driver is drunk above the permissible limit, the buzzer will sound and it will notify the driver that the engine will be locked into a certain time period.

After the engine locking, the GPS module tracks the location of the car and it will send SMS notifications to both the registered numbers/authorities to inform them about the issue. Thus, the system detects and prevents drunk driving incidents automatically.

1.3 Scope

This system can be used in all types of vehicles, including both commercial and personal. The benefits of this system include reducing the number of accidents caused by drunk driving, saving lives, and preventing people from breaking the law. It can also help to reduce insurance premiums and legal costs associated with drunk driving offenses. proceedings, and not as an independent document. Please do not revise any of the current designations.

II. Literature Survey

2.1 Introduction

In this we had done a survey by going through different research papers and form the literature which is basically about the researches done regarding our project or topic related near to them

2.2 Literature Review

Driving while either intoxicated or drunk is dangerous and drivers with high blood alcohol content (BAC) are at increased risk of car accidents, highway injuries and vehicular deaths. Prevention measures evaluated include license suspension or revocation, impounding or confiscating vehicle plates, enforcing open container bans, increasing fine penalties, jail, mandating education for youth and lowering legal BAC[9]. Rush driving and driving after consumption of alcohol is a major cause of road accidents worldwide. In this paper we proposed an idea to alert rush and drunk drivers at an early stage before an actual accident takes place. Complete system works on a cell phone having software installed in it with some sensor.

a)This paper presents a holistic, non intrusive approach for driving fitness detection by checking drowsiness of the driver and loss of vehicle control due to potential influence of alcohol, using computer vision techniques of facial landmark detection and motion detection. A smart phone camera is used to capture a real-time video feed of the driver in the vehicle. The proposed system continuously analyzes this feed to detect drowsiness by checking for persistent eye blinks using a single scalar quantity, Eye Aspect Ratio (EAR) which characterizes eye-opening

b)Nowadays, there is a significant increase in drunken-driving accidents from the past few years. Drunk driving has emerged as a significant problem in recent times. With the help of different technological implementations, many preventive measures are taken to date, such as alcohol detection sensors, detection using speech, detection using driving patterns, detection using IOT & Machine Learning techniques etc. But each system has its limitations, such as usability, complexity, scalability, burdensome implementation. This paper describes the various approaches to detect drunken driving with the advantages and disadvantages of each. Out of these approaches, the article focuses on the detailed literature review to discuss existing machine learning algorithms and IOT methodologies to improve the accuracy of the system which can be used in detecting drunken driving. At last, the comparative review is done for all these approaches and we found that Random forest classifier with two stage model is most efficient, having high accuracy.

c)Due to the rapid increase of vehicles on roads, the probability of road accidents is rising steeply. Drunk driving is considered to be a major cause of road accidents throughout the world.The main aim of this project is to develop a system that would detect the amount of alcohol that is consumed by the driver of the vehicle.
The proposed system aims at preventing the user from driving when drunk and thereby intends to reduce the number of accidents occurring due to drunk driving. The proposed model is developed using Arduino Uno and alcohol detection sensor (MQ-3) as its major components. As a safety measure, when the level of alcohol crosses a permissible limit, the vehicle ignition system (DC Motor) will be turned off and the concerned authority will be alerted using the GSM module .

d)This paper discusses design, development and live-performance test of the prototype of drink and drive situation detection and alert cum vehicle control system to minimize road mishaps and enhance public safety on road. It also analyzes the response of breath -alcohol semiconductor sensors with respect to variation in distance from source which is a critical part of system design. Based upon the recent smart gas sensing and integration of satellite and cellular wireless communication technologies, the proposed device quickly senses the drunken state of the driver during start-up/driving by estimating the equivalent breath alcohol concentration level corresponding to the legally permissible state's threshold blood alcohol concentration level. On detection of such a situation, on-vehicle siren/audio alarm is activated to warn the persons on road and vehicle control system is triggered to lock ignition or stop the fuel inflow to the vehicle. Additionally, an 'alert SMS' indicating the drunk driver's location, tracked by an onboard GPS receiver, along with vehicle number is communicated remotely to authorized (family members, traffic police) mobile users using GSM cellular network to take appropriate action thereafter. The live experiment results highlighted the successful working performance of the device in-housed at the steering wheel of the vehicle with the drunk driver.

e)Advanced digital maps have the capacity for real-time updating duly including information on areas where speed limits should be reduced due to adverse weather conditions or around accident scenes and road-works. This paper also discusses the onboard vision system by evaluating the surroundings of the vehicles and thereby improving the safety and efficiency of driving. It lies in the important ability for various recognitions like traffic signals, signs and pedestrians. Framework for integration of sensors and control modules in a scalable multi-agent system is provided. An SMS that contains the current GPS location of the vehicle is sent via a GSM module to the police control room to alert the police. The system is foolproof and the driver cannot tamper with it easily. Thus it provides an effective and cost-effective solution for the problem of drunk driving in vehicles.

f)The pervasive issues of drunk and distracted driving pose significant threats to road safety, particularly in urban areas witnessing a population surge. To counteract this menace, metropolitan cities necessitate preventive and scalable systems, albeit grappling with challenges of usability, complexity, and scalability. This study systematically explores a spectrum of methodologies deployed to address drunk driving, categorizing approaches into alcohol sensor-based systems, IoT or video-based solutions, hardware-driven ignition control, touch-based technology, and Machine Learning or Neural Network applications. Furthermore, the research critically assesses the accuracy of machine learning algorithms like Linear Discriminant Analysis, Support Vector Machine, Ada Boost, and Random Forest, shedding light on their potential in enhancing drunk-

driving detection. By unraveling the strengths and limitations of these technological interventions, the study contributes to a comprehensive understanding of the multifaceted strategies crucial for curbing the risks associated with drunk driving in contemporary urban environments.

g)Drunk driving, or officially Driving Under the Influence (DUI) of alcohol, is a major cause of traffic accidents throughout the world. In this paper, we propose a highly efficient system aimed at early detection and alert of dangerous vehicle maneuvers typically related to drunk driving. The entire solution requires only a mobile phone placed in the vehicle and with an accelerometer and orientation sensor. A program installed on the mobile phone computes accelerations based on sensor readings, and compares them with typical drunk driving patterns extracted from real driving tests. Once any evidence of drunk driving is present, the mobile phone will automatically alert the driver or call the police for help well before the accident actually happens. We implement the detection system on Android G1 phones and have it tested with different kinds of driving behaviors. The results show that the system achieves high accuracy and energy efficiency.

III. Theory Description

3.1Overview

3.1.1Drunk Driving Detection System

The detection system is primarily used to detect the driver is under the influence of alcohol. The system is very flexible and can be used in all cars.

Previously, the police had to set-up check posts to check for each car whether the driver is driving under the influence of alcohol which uses a lot of man force and time.

Also, there are alcohol blowers installed in the car itself to check for the driver's alcohol content before starting the car but the disadvantage is that any of the other passengers traveling along with the driver can blow air and start the engine so the purpose of providing the safety is not fulfilled.

This detection system eliminates most of the effort and saves a lot of time. Along with the detection it also turns off the car engine if the driver is detected to be under the influence of alcohol and it send the alert messages to the given numbers along with the GPS location.

The National Highway Traffic Safety Administration has also requested the present government to install this system in all cars which can save up to 10,000 lives.

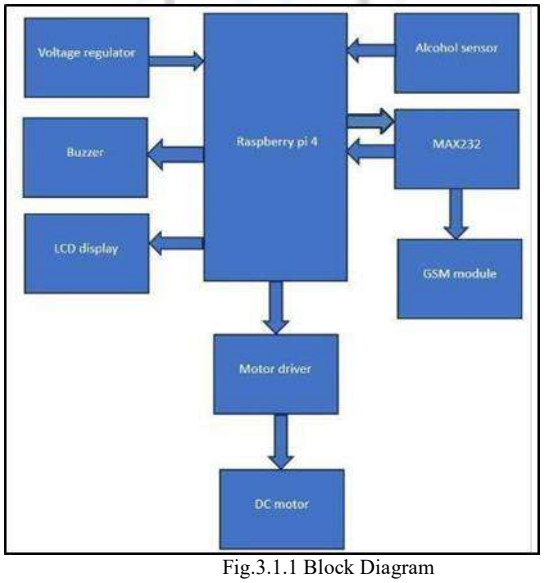

Fig.3.1.1 Block Diagram

3.1.2 Components

The Drunk Driving Detection system consists of the components listed below:

Controller

The user can program the controller for the required specifications upon receiving the inputs from various input devices connected to the system. As a result, the output is sent to perform the necessary action.

Input

There are many input devices available to generate a signal when alcohol is detected. The sensor detects the alcohol.

The GSM module takes the input from the number dialed on the system and the GPS module takes the input from the GSM module to accurately detect the location of the car.

Output

When the alcohol is detected, the output of the system is to switch off the engine in a fixed time period so that the driver can safely pull over the car and then to send the alert messages to the numbers registered along with the GPS location.

Input Components

Alcohol Detection Sensor

The sensor installed on the steering continuously detects the alcohol content when the driver is breathing. Once it reaches above the specified limit, it triggers the output.

GSM Module

This module accepts the two numbers which is then stored in the input directory of the module so that the alert messages are sent on the saved numbers.

GPS Module

After the detection it returns with the coordinates of the car by sending an SMS which helps to detect the location of the car.

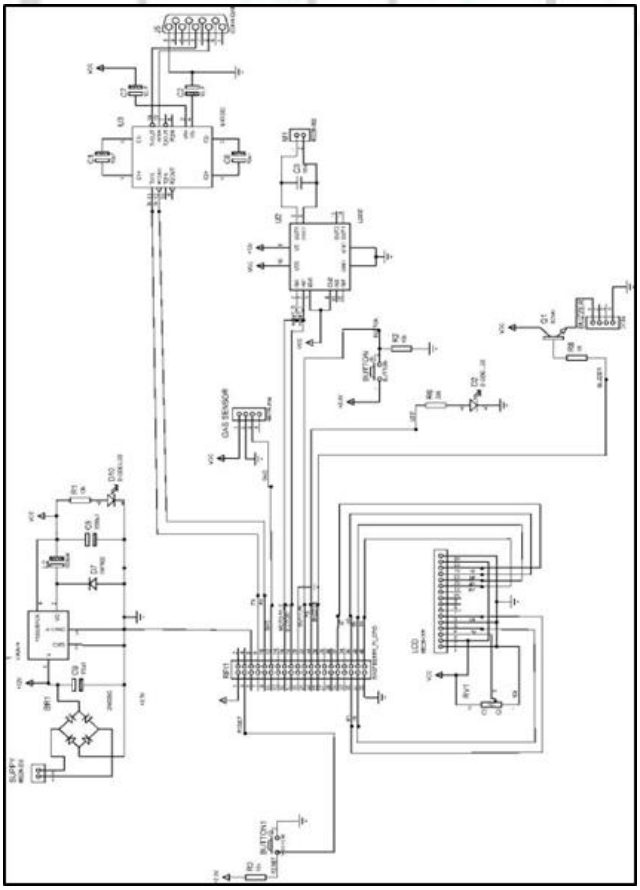

Fig 3.2.1 Circuit Diagram

The devices used are as follows
1.Raspberry Pi 4
2.Alcohol Sensor
3.L293D Motor driver
4.12V DC motor
5.LCD
6.Buzzer
7.GSM module

1. Raspberry Pi 4

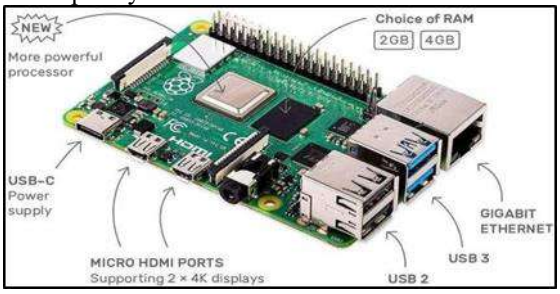

Fig 3.2.2 Raspberry pi 4

The Raspberry Pi 4 is a versatile single-board computer developed by the Raspberry Pi Foundation. It features a quad-core processor, multiple RAM options, dual 4K display support, USB 3.0 ports, Gigabit Ethernet, and wireless networking. The Raspberry Pi 4 is used in our project as a controller due to its effective and easy to use features. It is use to control all the components in our project effectively.0

2. Alcohol Sensor

Fig.3.2.3. Alcohol Sensor

This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breath analyser. It has a high sensitivity and fast response time.
Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple; all it needs is one resistor. A simple interface could be a 0-3.3V ADC. It acts as a main component in our project whose task is to detect the alcohol level in the driver's breath and do the required task as per the condition.

3. L293D Motor driver:

Fig 3.2.4 L293D Motor Driver

L293D integrated Circuit (IC) is a dual H-bridge motor driver. The IC acts as an amplifier as it takes in a lower current signal and provides a higher current signal which is used to drive the motor connected. We have use this IC to run and stop the motor which is actingas a engine and this will play an important role in our ignition lock system.

4. 12V DC motor

Fig 3.2.5 DC motor

The DC motor is a high torque and low noise 12V, 60 RPM geared electric motor. The two leads behind the motor connect to a 12 volt power supply, which either rotates in a clockwise or an anti-clockwise direction depending on the polarity. We have used a DC motor as a replacement of the actual engine.

5. LCD

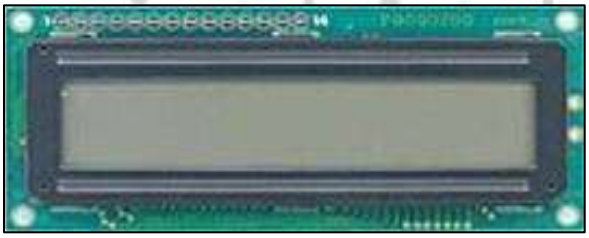

Fig 3.2.6 LCD Display

Liquid crystal display (LCD) has material which combines the properties of both liquid and crystals. They have a temperature range within which the molecules are almost as mobile as they would be in a liquid but are grouped together in an order form similar to a crystal.It is acting as a display for our project and is use to display the required information.

6.Buzzer

Fig 3.2.7 Buzzer

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical. The main function of this is to convert the signal from audio to sound. We have use this in our project to alarm the driver by making the sound in order to alert him/her as if they are drunk and to prevent the mishappening.

7. GSM module

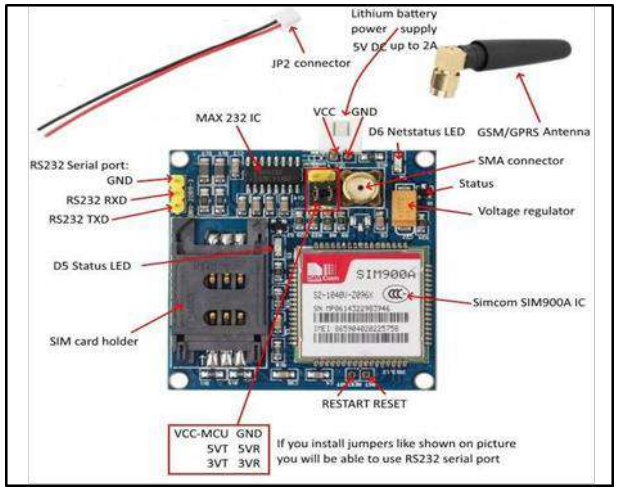

Fig.3.2.8 GSM Module

GSM (Global System for Mobile Communications) is the most popular standard for mobile telephony systems in the world. We have use this GSM module for sending message/tracking location in order to provide information about the driver to his/her loved ones and ensure safety These devices are connected, placed and programmed to work as specified.

1) The Raspberry Pi has to be connected to the AC mains with a 3.3v adapter.

2) The GPIO Pin 3 is connected to pin 2 of a switch button which is used to reset the whole device. Pin 1 of switch button is connected to the VCC.

3) The GPIO Pin 6 is connected to the combination of resistors of 12k, capacitors of 1000uf,470uf, inductor of 100mH, bridge rectifier, and LM2576 voltage regulator so as to protect the other components on the device from damaging.

4) GPIO Pin 8 is connected to the transmitting pin 11 of MAX 232 module.

5) Pin 10 of the GPIO is connected to the receiving pin 12 of MAX 232 module.

6) Pin 2 and 6 of the Max 232 module is connected to two 10uF capacitors.

7) Pin 13 and 14 of the MX 232 module is then connected to RS 232 as an input.

8) Pin 12 of GPIO is connected to the pin 3 of Alcohol sensor MQ-2. Pin 1 is connected to VCC and Pin 2 is connected to GND.

9) Pin 16 and 18 of the GPIO is configured as an output and coupled to the pin 2 and 7 of the Motor driver L293D module.

10) Pin 8 is connected to the positive terminal of a 12- vot supply that powers the DC motor for it operation. The negative terminal of the supply is grounded.

11) Pin 3 and pin 6 are connected to the leads of the motor for operation.

12) Pin 4 and pin 5 are the ground pins of the driver which are connected to the ground of the raspberry pi.

13) Pin 22 of GPIO is connected to a button which switches on the device.

14) GPIO pin 20 of raspberry pi is connected to the ground.

15) Pin 24 of GPIO is connected to an LED which is coupled with a resistor of 220 ohms to prevent it from getting damaged.

16) Pin 26 of the raspberry pi is connected to the pin 1 of buzzer which is coupled with a transistor on emitter mode.

17) GPIO Pin 35, 37 is connected as rs and en to the LCD pin 6,4.

18) The data pins of LCD 11,12,13,14 are connected to the GPIO pin 40,38,36,32 of raspberry pi.

19) Pin 3 of the LCD is connected to the variable potentiometer so as to adjust the brightness of the LCD.

20) Pin 39 of the raspberry pi is connected to the ground.

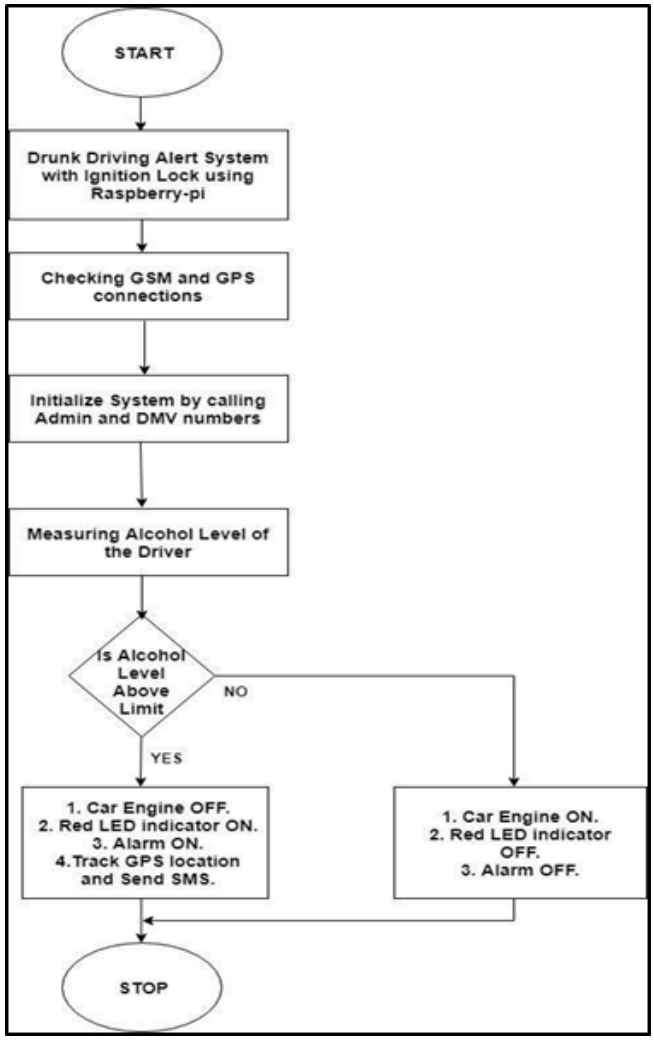

Fig. 3.2.9 Flowchart

Flow chart description

1) The drunk driving alert system is initialized by giving the DC power of 9V-12V.

2) The LCD on the circuit displays the message of "Alcohol Detection System".

3) Upon initialization, it checks for the GSM and GPS connections by sending a hand- shaking signal to SIM module.

4) The device asks for the initialization of GSM module by asking for 2 numbers to be stored in the memory which is termed as the Admin number and DMV number. The user calls on the device number from the respective above mentioned numbers. Thus, the number are stored on the device and the car engine ignites and the system starts running successfully.

5) When the engine is running, the alcohol sensor connected on the device continuously checks for the alcohol content in the breath of the driver.

6) If the alcohol content is below the threshold of 20% of the sensor value then the engine runs at the normal speed and there is no change.

7) If the alcohol content is detected to be in the speed of 20%-50%, it reduces the speed of the engine to half of the driving speed.

8) If the alcohol content is detected to be beyond the threshold limit of 50%, it displays the message of the "Alcohol above Limit" and gives certain time period to stop the car safely. If unable to do it lock the ignition by making the engine speed to 0 and then blinks the red led and sounds the buzzer to notify that the alcohol is above limit.

9) After the ignition is locked it tracks the GPS location of the car and then sends the message to the Admin and DMV numbers stored before stating them the car driver has been found the alcohol above limit and then sends the GPS location of the car.

IV. Applications

The application of DDASIL goes beyond individual vehicles and can have a substantial impact on public safety, law enforcement, and the overall reduction of drunk driving incidents.
The Drunk Driving Alert System with Ignition Lock (DDASIL) has several important applications some of them are as follows:

1. Road Safety: DDASIL's primary application is to enhance road safety by preventing drunk driving incidents. It acts as a proactive measure to keep impaired individuals from operating a motor vehicle, reducing the risk of accidents and injuries.

2. Preventing Accidents: By disabling the vehicle's ignition if impairment is detected, DDASIL helps prevent accidents caused by intoxicated drivers, which can lead to property damage, injuries, and loss of life.

3. Law Enforcement: Law enforcement agencies can use DDASIL as a tool for monitoring and enforcing drunk driving laws. The system can provide evidence of attempted drunk driving, aiding in legal proceedings.

4. Fleet Management: DDASIL can be applied in commercial fleet management to ensure that drivers do not operate vehicles under the influence of alcohol. This is particularly important for companies that transport goods or passengers.

5. Personal Vehicles: Individual car owners can install DDASIL to prevent unauthorized use of their vehicles by impaired individuals, such as teenagers or unauthorized drivers.

6. Ignition Interlock Devices (IIDs): DDASIL can be adapted

as an ignition interlock device for individuals who have been convicted of drunk driving offenses. It helps ensure they are sober before driving.

7. Ride-Sharing Services: Ride-sharing companies can implement DDASIL to enhance the safety of passengers and other road users by preventing impaired drivers from joining their network.

8. Public Transportation: In certain public transportation systems, DDASIL can be used to ensure that operators are not under the influence while on duty, safeguarding passengers and pedestrians.

9. Community Programs: DDASIL can be part of community initiatives and awareness campaigns aimed at reducing drunk driving. It encourages responsible behavior and safer roads.

10. Insurance Incentives: Some insurance companies offer discounts to drivers who install and use DDASIL, as it reduces the risk of accidents, thereby decreasing the financial burden on insurers.

V. Summary

This report delves into the intricate synergy of various circuits coalescing to form the innovative "Drunk Driving Alert System with Ignition Lock" (DDASIL), presenting a comprehensive study on its potential societal impact. The DDASIL project integrates a MQ3 sensor for alcohol level detection and a GSM module for location tracking, ensuring real-time monitoring of a driver's sobriety. The central control unit analyzes data in real-time, and if predetermined alcohol thresholds are exceeded, DDASIL proactively engages an ignition lock, thwarting the vehicle's start. This preventative measure seeks to curb accidents, save lives, and mitigate the social and economic toll of drunk driving. While DDASIL demonstrates technological promise, its implementation prompts considerations of privacy and legal implications, emphasizing the delicate balance between public safety and individual rights. Despite these challenges, DDASIL emerges as a forward-looking solution with the potential to significantly enhance road safety.

VI. Acknowledgement

We would like to express our heartfelt gratitude to all those who contributed to the successful completion of our group project titled "Drunk Driving Alert System with Ignition Lock," which aimed to prevent drunk driving accident and promote road safety. This project has been a significant endeavor, and it would not have been possible without the support, guidance, and assistance of numerous individuals and organizations.

First and foremost, we extend our sincere thanks to our project Mentor, Prof.Sweta Waghmare, for their expertise, encouragement, and unwavering support throughout this endeavor. Their mentorship and insights significantly contributed to the project's success and guided our group through the entire process.

In addition, we would like to acknowledge the support and guidance provided by the Head of the Department Dr. Avinash R. Vaidya. Their encouragement and assistance were instrumental in shaping the project's direction and ensuring access to essential departmental resources for our group. We are also grateful to the Principal of Pillai College of Engineering, Dr. Sandeep Joshi ,for creating an academic environment that fosters research and innovation. Their leadership and commitment to academic excellence provided the foundation for our project's success.

We wish to express our deep appreciation to each member of our project team. Their collective effort, commitment, and shared enthusiasm were integral to the quality of our work. This project truly exemplifies the strength of teamwork and collaboration. Finally, we extend our thanks to all other individuals and organizations that, in various capacities, contributed to the successful completion of our project. Your collective efforts have been fundamental in bringing this innovative system to fruition, and we appreciate your support.

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Harnessing Clean Energy with Solar Panel Wipers: An Arduino Adventure

Shravani Sandeep Jadhav , Shridith Shridhar Devadiga , Prathamesh Prashant Pore , Hitesh Pravin Deore
Prof. Sweta Waghmare

***Abstract* - The Solar Panel Wiper Project is an innovative and sustainable solution designed by students to enhance the efficiency of solar energy systems. Solar panels often accumulate dust, dirt, and debris, reducing their energy generation capacity. To address this issue, our project introduces a low-cost, automated wiper system that periodically cleans the surface of solar panels. The system is equipped with sensors to detect environmental conditions, and a programmable controller to initiate cleaning cycles when necessary. This project not only aims to improve solar panel performance but also provides students with a practical learning experience in renewable energy and automation technology. By maintaining clean solar panels, this project contributes to the promotion of clean energy and the mitigation of climate change, making it an ideal educational endeavor for aspiring engineers and environmentally conscious individuals.**

Keywords-Solar Panel, Arduino Uno.

I. INTRODUCTION

In our rapidly changing world, sustainability and renewable energy have become more critical than ever. Among the numerous innovations aimed at reducing our carbon footprint, solar panels are at the forefront. Solar panels are designed to convert sunlight into electricity, making them a sustainable and environmentally friendly source of energy. However, for solar panels to operate at their highest efficiency, they must remain clean and free from dirt and debris. This is where our exciting project comes into play: the Solar Panel Wiper using Arduino. In this project, we will combine the power of solar panels and Arduino to create an automated system that keeps solar panels clean and efficient. We will design a wiper mechanism that moves across the surface of the solar panel, cleaning away dirt and debris. The Arduino microcontroller will act as the brain of our system, controlling the wiper's movements and ensuring it operates only when necessary.

II. LITERATURE REVIEW

We observed that the energy requirement is increasing day by day and the sources to get the fuel for generation of the electricity are getting less and less. The solar energy is the free and widely available in the surroundings. The 70% of the needs for electricity are fulfilled by the non-renewable energy sources. There are multiple automatic solar panel cleaning systems are available in market but they are so costly that the middle-class people who are having the solar panel for electricity generation cannot have that system so he goal is to build the system which is affordable for the middle class families too.

III. BLOCK DIAGRAM OF PROPOSED SYSTEM

A. Overview Of the Project:

In this circuit we have made use of robot using H bridge and ultrasonic distance sensor. The robot will carry the wiper as the robot will move in forward direction. At night time lm393 light sensor will send signal to Arduino and the circuit will start moving in forward direction. while moving in forward direction the wiper attached to the robot will wipe the dust over the panel which is made of micro fiber cloth which will not cause any scratch or damage to the surface of the panel.After completing one round of moving forward and backward the code will stop and the robot will pause.

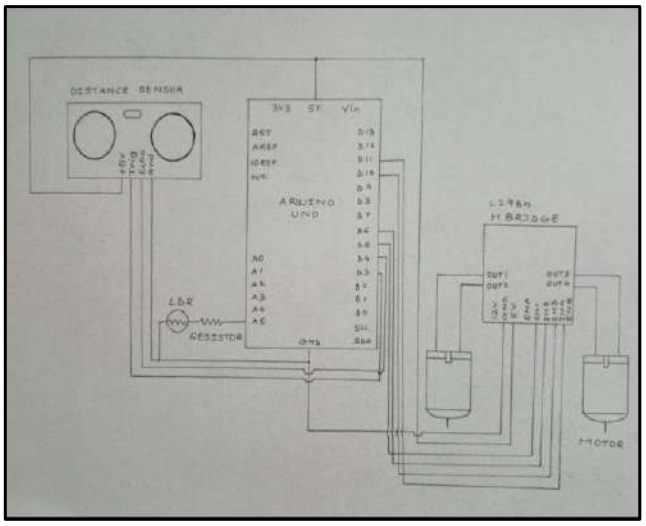

Fig. 3.1 circuit diagram

B. Existing System Architecture

1) Arduino: Arduino is an open-source microcontroller platform that is widely used in various projects. It is known for its simplicity, flexibility, and versatility, making it ideal for prototyping and DIY electronics. You can create projects involving sensors, motors, and more, with a vast online community to support your endeavors.

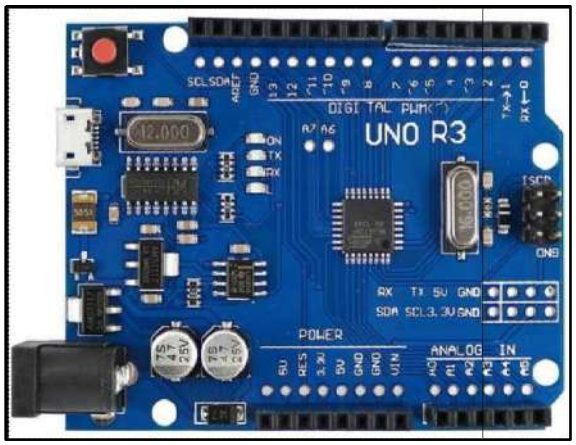

Fig. 3.2 Arduino uno

2) Ultra Sonic Distance Sensor : As the name indicates, ultrasonic level sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected from the target. ultrasonic level sensors measure the distance to the target by measuring the time between the emission and reception.

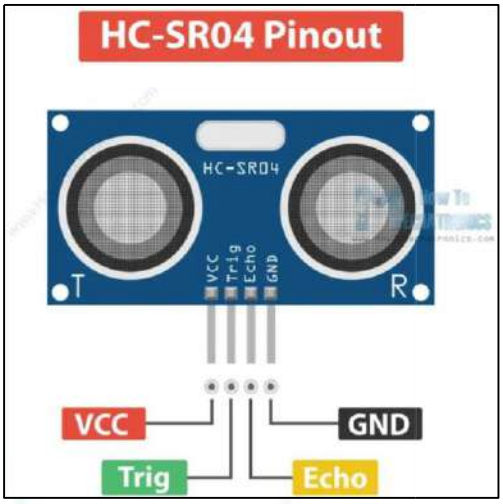

Fig. 3.3 Ultra sonic distance sensor

3) H- bridge: An H-bridge is an electronic circuit that allows the control of a motor's direction by reversing the polarity of the voltage applied to it. It's commonly used in robotics and other applications to control the rotation of DC motors or stepper motors.

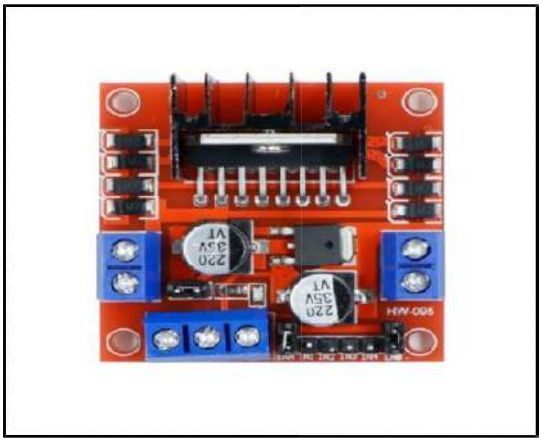

Fig. 3.4 H- bridge

4) LDR Sensor: An LDR (Light-Dependent Resistor), also known as a photoresistor, is a type of passive , electronic component that changes its electrical resistance in response to varying levels of light. When it gets dark (low light conditions), the LDR's resistance increases, and this can be used to trigger the LED to turn on automatically, providing illimitation in the dark.

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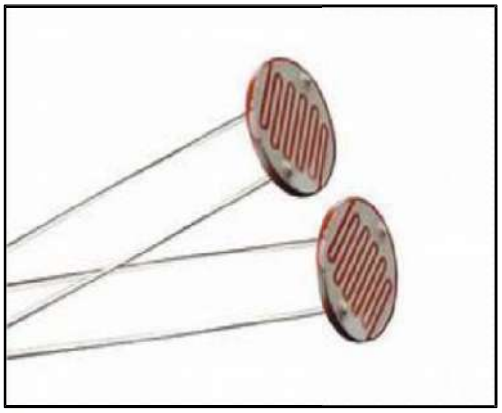

Fig. 3.5 LDR sensor

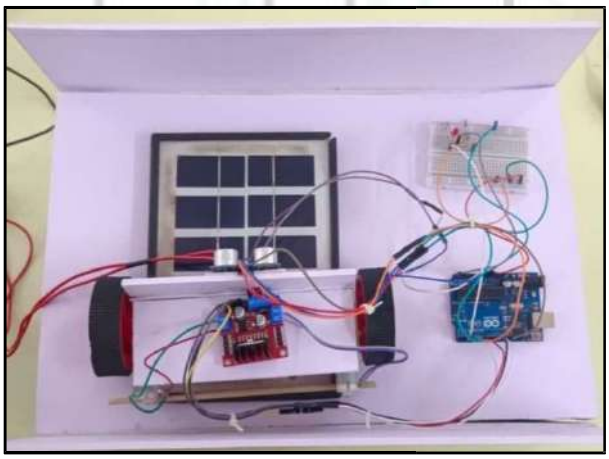

Fig 3.6 Actual model picture

IV. RESULTS AND DISCUSSION

The primary objective of our solar panel wiper system is to boost solar panel efficiency by maintaining a clean surface. Test results unequivocally show a marked improvement in energy production when the system is in action. To ensure energy efficiency, the system is powered by a separate solar panel or battery, preventing any power consumption from the solar panels it cleans and safeguarding the overall net energy gain of the solar installation. A distinctive feature is the customizable Arduino program, allowing users to set parameters such as the light intensity threshold for wiper activation and cleaning frequency. This adaptability empowers users to tailor the system to the specific environmental conditions and cleaning needs of their solar panels. Our primary mission is to raise awareness about the challenges associated with manual solar panel cleaning. Through innovation, we aim to address these difficulties and provide users with an efficient means to ensure optimal performance from their solar installations.

V. CONCLUSIONS

In conclusion, the solar panel wiper system using Arduino presents a practical and efficient solution to enhance the performance of solar panels by maintaining their cleanliness .Overall, the solar panel wiper system using Arduino represents a valuable addition to solar installations, offering automated, efficient, and environmentally friendly cleaning of solar panels.

ensures that solar panels consistently operate at their maximum potential, reducing energy waste and minimizing the environmental footprint of energy production. While initial costs and maintenance requirements should be considered, the long-term benefits in terms of increased energy The Solar Panel Cleaning System project aimed to bring a better solution for maintaining solar efficiency. The main scope was to develop a machine that can clean a solar panel by a proper control system. This project is a developed prototype to expand on a new and increasing market. The project team hit many obstacles along the way. Designing the control system required learning configurations, coding and its interference with the electrica components. Using soldering boards to implement the designed circuit, hardware wiring, relays and machinery were new experiment. The DC motors were controlled by both relays and drivers to accomplish speed and directions control.

Fig. 5.1 Actual model picture

VI. FUTURE SCOPE

Our Solar panel cleaning model is a model that will be used to lessen the efficiency loss caused by dust deposition. This project like ours was previously idealized by some of the district in Rajasthan and was executed. And by adding more components I am sure this project is success. The future scope of an Arduino- controlled solar panel wiper system depends on several factors, including technological advancements, environmental considerations, and market demand. Here are some potential avenues for the development and application of such a system The future scope of Arduino- controlled solar panel wipers is promising, with opportunities for increased efficiency, automation, and environmental sustainability. As solar energy continues to play a significant role in the transition to clean energy sources, technologies that support solar panel maintenance will likely continue to evolve and find broader applications

ACKNOWLEDGEMENT

We extend our deepest gratitude to Prof. Sweta Waghmare, who served as our project guide, offering unparalleled knowledge and unwavering encouragement throughout our project. Her expertise has been invaluable in guiding us towards success. Our thanks also go to Dr Avinash Vaidya, Professor & Head of the Department, Electronics and Telecommunication Engineering, for generously providing the necessary facilities crucial for the completion of our project work. His support has played a pivotal role in the successful realization of our project goals. We appreciate the mentorship and resources provided by both Prof. Sweta Waghmare and Dr Avinash Vaidya, which have significantly enriched our academic journey.

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Raspberry Pi Based ATM Security System

Shreyas Kunder, Mayur Vetal, Nikhil Mane, Aftab Mulani

Abstract*—In today's technologically advanced landscape, the security of Automated Teller Machines (ATMs) is of paramount importance. This project introduces a comprehensive Raspberry Pi-based ATM Security System, implemented in Python, with a user-friendly Tkinter graphical user interface (GUI) and integrated components like Fingerprint recognition, GSM communication, RFID card scanning, and surveillance cameras. The system aims to enhance the safety and reliability of ATM transactions. Key features of this innovative system include Fingerprint Authentication, Card Skimming Detection with RFID, Real-time Camera Surveillance, GSM Communication, User-Friendly Tkinter GUI. The system captures and analyzes the user's fingerprint using integrated cameras and biometric sensors. By comparing them with a secure database of authorized users, unauthorized access is effectively prevented. Advanced RFID technology is employed to detect card skimmers, a common tool used by criminals to steal card data. Suspicious activity triggers an immediate alert and the disabling of the ATM. Surveillance cameras provide real-time video feeds, enhancing security. ATM operators can remotely monitor activities, respond to alerts, and disable the ATM if any suspicious behavior is detected. The system integrates GSM technology for efficient communication with bank authorities. In case of a security breach or emergency, the system sends instant notifications and alerts to designated personnel. The system's Tkinter-based GUI provides an intuitive and user-friendly interface for ATM users, ensuring a seamless experience while maintaining a high level of security. By seamlessly integrating these components, the Raspberry Pi-based ATM Security System offers a comprehensive solution to safeguard ATM transactions, prevent fraud, and protect user information. This project represents a significant advancement in the development of a more secure and efficient ATM infrastructure, contributing to the overall safety of the financial ecosystem.

***Keywords*—Automated Teller Machines (ATMs), Raspberry Pi-based ATM Security System, Python, Tkinter graphical user interface (GUI), Fingerprint recognition, GSM communication, RFID card scanning**

I. INTRODUCTION

The Raspberry Pi-based ATM Security System represents an innovative approach to enhancing the security and reliability of Automated Teller Machines (ATMs). At its core, this system relies on a set of fundamental principles that ensure the safety and integrity of ATM transactions.

Raspberry Pi Platform: The foundation of the system is the Raspberry Pi, a versatile and cost-effective microcomputer. This credit-card-sized computer provides the computing power and flexibility needed to execute various security and monitoring tasks.

Real-time Surveillance: Central to the system is a network of surveillance cameras strategically positioned around the ATM location. These cameras continuously monitor the surroundings, capturing real-time video footage to detect and deter criminal activity.

Biometric Authentication: The system employs biometric authentication methods, such as facial recognition and fingerprint scanning. By verifying the identity of ATM users through their unique biometric data, it significantly enhances the security of the transaction process.

Card Skimming Prevention: RFID technology is integrated into the system to detect and prevent card skimming, a common method used by criminals to steal card data. RFID readers ensure the authenticity of user cards and safeguard against fraudulent activities.

Remote Monitoring and Control: The system enables remote monitoring and control capabilities, allowing ATM operators to view real-time camera feeds, receive alerts, and take actions such as disabling the ATM in response to suspicious activities. By leveraging these fundamental principles, the Raspberry Pi-based ATM Security System delivers a comprehensive and robust solution that not only safeguards ATM transactions but also maintains the trust and integrity of the banking system.

II. LITERATURE SURVEY

The advent of technology has revolutionized the way we interact with Automated Teller Machines (ATMs). However, with technological advancements, there is an escalating need for robust security systems to protect users from evolving security threats. The Raspberry Pi-based ATM Security System presents a promising solution to address these concerns. In this literature survey, we explore the existing research and developments related to Raspberry Pi-based ATM security systems, covering aspects of hardware, software, and security protocols.

2.1) Authentication and access control

Techniques in this category focus on verifying the identity of the ATM user and controlling access to the ATM. This includes biometric authentication methods like fingerprint, iris, and facial recognition, as well as traditional methods like PIN protection.

2.1.1) Biometric authentication

This technique is used by Singh, A., & Verma, H. K. [1]

for Biometric-Based ATM Security purpose. This Focuses on biometric authentication methods such as fingerprint recognition, iris scanning, and facial recognition for securing ATMs. Biometric authentication methods use unique biological or behavioral characteristics of individuals for identity verification.

2.1.2) Pin protection

It was developed by Author Parikh, S., & Desai, R. (2014). [2] for Secure PIN Entry Methods for ATM Banking purpose. Discusses PIN-based security methods and various techniques to protect Personal Identification Numbers (PINs) from being stolen. PIN (Personal Identification Number) protection involves securing the entry and storage of PINs to prevent unauthorized access. PINs are crucial for ATM transactions, and any compromise can lead to fraud.

2.2) Image processing and surveillance

Image processing techniques involve the use of cameras and sensors for surveillance and security. This includes capturing images or videos for user authentication (e.g., facial recognition) and monitoring for unauthorized activity near the ATM.

2.2.1) Image Processing Techniques:

This technique is used by Author Patil, D. S., & Mane, S. B. (2014) [3] for Enhancing ATM Security using Image Processing Techniques. Explores image processing techniques for enhancing approach for increasing the atm security system. The proposed technique provides improvements in addressing two major challenges of this domain system: Data Security and Privacy and False Alarms and System Reliability. ATM security, including cardless transactions, facial recognition, and motion detection. Image processing involves using cameras or other sensors to capture and analyze images or video to enhance ATM security. This can include user authentication through facial recognition, detecting unauthorized individuals near the ATM, or even reading QR codes for secure transactions.

2.2.2) Hybrid Approach One

Author G. Jakeer Hussain1, T. Srinivas Reddy2 has presented a hybrid approach [4] of IOT and surveillance technique for Anti-Theft ATM Security using Raspberry Pi purpose. The architecture is shown in Figure 2.1 It explores a new hybrid model.

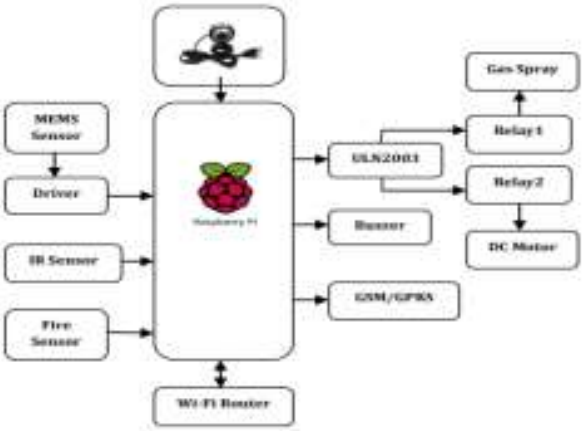

Fig. 2.1 IOT and surveillance technique used by G. Jakeer Hussain1, T. Srinivas Reddy et al. [4]

2.3) Literature Summary

Table 2.1 Summary of literature survey

SN	Paper	Advantages and Disadvantages
1.	Singh, A., & Verma, H. K. [1]	Advantages: This improves the security for atm system and reduces the theft possibilities. Disadvantages: Does not completely overcome the problem of Data security and encryption.
2.	2. Author Parikh, S., & Desai, R. (2014) [2]	Advantages: Improves the security for card users. Disadvantages: It does not reduce possibilities of theft, even though an ATM card has a pin it can be used by another unauthorized person if he knows the pin.

3.	Patil, D. S., & Mane, S. B. (2014) [3]	Advantages: This really showed the good impact on the atm security system by using facial recognition and motion detection techniques. Disadvantages: This does not address about the data security and encryption.
4.	G.Jakeer Hussain1,T.Srinivas Reddy[4]	Advantages: It uses a hybrid approach that has a really good impact on atm security. Disadvantage: It does not consider the Biometric authentication technology which would give better results.

III. PROPOSED METHODOLOGY

3.1) OVERVIEW

The classification of various techniques the domain is given in Figure 3.1

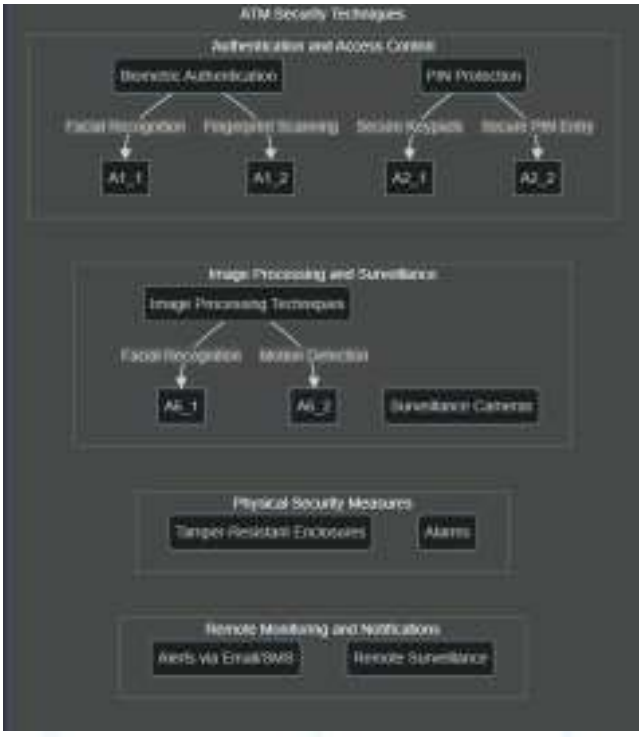

Fig.3.1 Classification of domain techniques

***Authentication and access control*:** Authentication and Access Control plays a pivotal role in ensuring the security of ATM transactions. The use of biometric authentication and PIN protection can enhance security by combining something the user knows (PIN) with unauthorized access and protect user data.

Image Processing and Surveillance: In the context of ATM security involves the use of cameras, sensors, and image analysis techniques to monitor and enhance the security of ATM machines. Image processing and surveillance are important tools in enhancing ATM security by monitoring the ATM environment, facilitating user authentication, and ensuring the safety and integrity of transactions. However, proper implementation and consideration of privacy and legal regulations are necessary to maintain a balance between security and user rights.

***Authentication and access control*:** Authentication and Access Control plays a pivotal role in ensuring the security of ATM transactions. The use of biometric authentication and PIN protection can enhance security by combining something the user knows (PIN) with something they are (biometric data). It's essential to implement these techniques effectively to ensure the machine's availability and integrity. Physical security measures are a critical component of ATM security, as they provide protection against physical threats that could compromise the integrity of the machine or the safety of users. These measures work in conjunction with other security techniques, such as authentication, data security, and surveillance, to create a comprehensive security framework for ATMs.

Remote monitoring and notification: In the context of ATM security involve the use of technology and systems that enable real-time monitoring of ATMs from remote locations and the generation of notifications or alerts in response to security breaches or other events. This technique is essential for maintaining the security and availability of ATM networks. Remote monitoring and notifications are critical elements of ATM security, allowing for proactive management, rapid incident response, and the safeguarding of financial transactions. These techniques help ensure the continuous and secure operation of ATM networks.

3.2) PROPOSED SYSTEM ARCHITECTURE

The previous sections discussed the strengths and weaknesses of the existing system. In order to achieve better domain results, researchers combined both techniques to build Hybrid domain systems, which seek to inherit advantages and eliminate disadvantages. In general, our systems use multiple techniques together to achieve a synergy between them. Although there exist a number of techniques that can be used (i.e. IoT techniques such IR sensor, gas sensor etc), our work

will mainly focus on the combination of Authentication and Access Control and Image Processing and Surveillance techniques. The proposed architecture is shown in Figure 3.3.

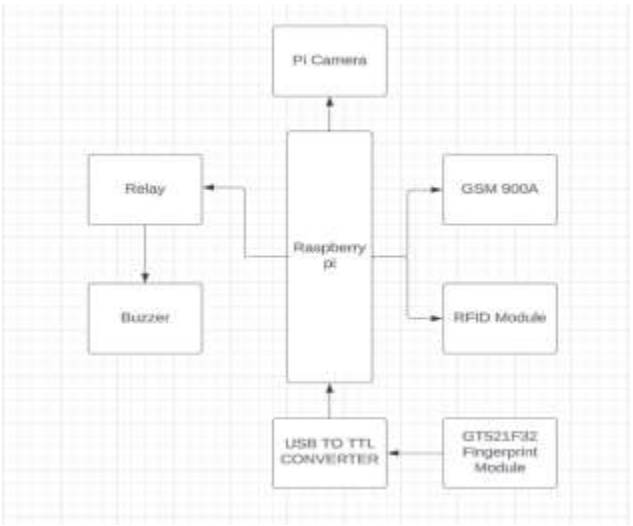

Fig. 3.1.2 Proposed system architecture

As we can see in the circuit image the components to build the system which will convert the weaknesses of existing system into strengths and achieve better results are Raspberry Pi3B+, Cam, GSM 900A module, EM-18 RF module, GT511C3 Optical fingerprint scanner module, Relay, Buzzer, USB to TTL Converter. Mainly techniques that are used in this project which makes difference from others is Biometric authentication and Image Processing and Surveillance.

Authentication and access control: Authentication and Access Control plays a pivotal role in ensuring the security of ATM transactions. The use of biometric authentication and PIN protection can enhance security by combining something the user knows (PIN) with something they are (biometric data). It's essential to implement these techniques effectively to prevent unauthorized access and protect user data.

● **Biometric authentication:** Biometric authentication involves using unique biological or behavioral characteristics of individuals for identity verification. Common biometrics used in ATMs include facial recognition, fingerprint scanning, and iris recognition. Users need to provide their biometric data, which is then compared to stored data for verification.

Advantages: Highly secure, as biometric data is difficult to fake; eliminates the need for remembering PINs or carrying physical cards.

● **PIN Protection:** PIN (Personal Identification Number) protection involves securing the entry and storage of PINs, which are essential for ATM transactions. This can include secure PIN entry interfaces and the encryption of PINs during transmission and storage. ATMs are equipped with secure PIN entry interfaces, typically composed of tamper-resistant keypads or touchscreen displays. These interfaces are designed to protect the entry of the user's PIN by making it difficult for anyone to observe or capture the PIN during entry.

Advantages: Simplicity and familiarity for users; relatively secure when used with other authentication methods.

● **Image Processing and Surveillance:** In the context of ATM security involves the use of cameras, sensors, and image analysis techniques to monitor and enhance the security of ATM machines. Image processing techniques are used to analyze images or videos captured by cameras near or within the ATM. This can involve several methods, including facial recognition, motion detection. Surveillance cameras are placed around ATMs to capture video footage of the surrounding area. Motion detection technology is used to detect and analyze movements, helping to identify suspicious or unauthorized activity near the ATM.

Advantages: Facial recognition can help identify and authenticate users, Provides real-time monitoring and evidence collection for security incidents.

IV. IMPLEMENTATION AND RESULTS

Implementing a Raspberry Pi-based ATM security system involves various components and steps.

1) Hardware Components

Raspberry Pi: Select a suitable Raspberry Pi model with sufficient processing power and connectivity options.

RFID Module: Choose an RFID module (e.g., EM-18) for card authentication.

Fingerprint Sensor: Select a compatible fingerprint sensor to capture and verify biometric data.

Pi Camera: Use the Raspberry Pi Camera Module for capturing user images and videos.

GSM Module: Integrate a GSM module for remote communication and alerts.

ATM Hardware: Ensure that the Raspberry Pi interfaces correctly with the ATM's hardware components (e.g., card reader, cash dispenser).

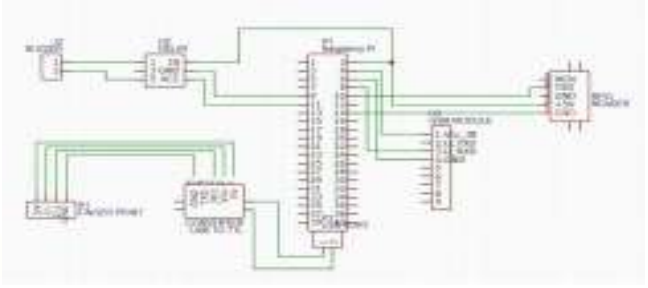

Fig..3.2. a) Circuit diagram

2) Software Components

Operating System: Install a Raspberry Pi-compatible OS (e.g., Raspbian or Raspberry Pi OS).

Security Software: Develop or install software to manage authentication, security monitoring, and alerting.

Biometric Software: Implement biometric recognition software to interface with the fingerprint sensor.

Camera Software: Configure the Raspberry Pi to capture images and videos when required.

Database: Set up a database to store transaction records, user data, and security incident logs.

3) System Configuration

Configure the Raspberry Pi to interface with hardware components, such as the RFID module, fingerprint sensor, and camera.

Ensure that the GSM module can send and receive messages and alerts.

Set up a secure network connection to transmit data to the bank's servers or a central security monitoring system.

4) User Authentication

Develop the software logic for user authentication, which involves card verification using the RFID module and biometric verification through the fingerprint sensor.

Implement secure user PIN entry.

5) Security Monitoring

Create a security monitoring system that continuously scans for unauthorized access, tampering, or skimming devices. Implement intrusion detection algorithms to trigger alarms in the case of unauthorized access.

6) Transaction Recording

Develop software to record ATM transactions, including transaction timestamp, amount, user data, and transaction status.

Store transaction data securely in the database.

7) Alerting and Reporting

Configure the system to send alerts and reports to bank staff or security personnel in real-time through the GSM module or secure network connection.

Implement logging and reporting features for security incidents.

8) Remote Monitoring

Set up remote monitoring capabilities, enabling bank staff to monitor ATM status and access transaction data.

Implement a secure remote access system for authorized personnel.

9) Biometric Data Management

Store and manage biometric data securely, ensuring privacy and compliance with relevant regulations.

10) Compliance and Testing

Ensure the system complies with industry standards, security regulations (e.g., PCI DSS), and data privacy laws. Conduct rigorous testing, including penetration testing, to identify vulnerabilities and weaknesses.

11) Maintenance and Updates

Establish a maintenance plan to regularly update and patch the system to address security vulnerabilities and improve functionality.

12) Training and Support

Provide training for ATM operators and bank staff on using the system and responding to security incidents.

13) Backup and Redundancy

Implement backup systems and redundancy to ensure system availability even in the event of hardware or software failures.

14) Legal and Ethical Considerations

Address legal and ethical considerations, including consent for biometric data usage, data retention policies, and customer notifications.

15) Documentation

Create comprehensive system documentation, including user manuals and incident response protocols. The implementation of a Raspberry Pi-based ATM security system is a complex undertaking, involving both hardware and software integration, stringent security measures, and adherence to regulatory requirements. Collaboration with experienced professionals and security experts is essential to ensure the system's reliability and effectiveness.

fig 3.2 b) Hardware connection

3.2.1) Technique Used

Authentication and access control: Authentication and Access Control plays a pivotal role in ensuring the security of ATM transactions. The use of biometric authentication and PIN protection can

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Physical Security Measures: In the context of ATM security are designed to protect the ATM machine itself and its surrounding environment from physical tampering, vandalism, or theft. These measures are essential for safeguarding the ATM infrastructure and ensuring the machine's availability and integrity. Physical security measures are a critical component of ATM security, as they provide protection against physical threats that could compromise the integrity of the machine or the safety of users. These measures work in conjunction with other security techniques, such as authentication, data security, and surveillance, to create a comprehensive security framework for ATMs.

Remote monitoring and notification: In the context of ATM security involve the use of technology and systems that enable real-time monitoring of ATMs from remote locations and the generation of notifications or alerts in response to security breaches or other events. This technique is essential for maintaining the security and availability of ATM networks. Remote monitoring and notifications are critical elements of ATM security, allowing for proactive management, rapid incident response, and the safeguarding of financial transactions. These techniques help ensure the continuous and secure operation of ATM networks.

3.2.2) Use Case Diagram / Activity Diagram:

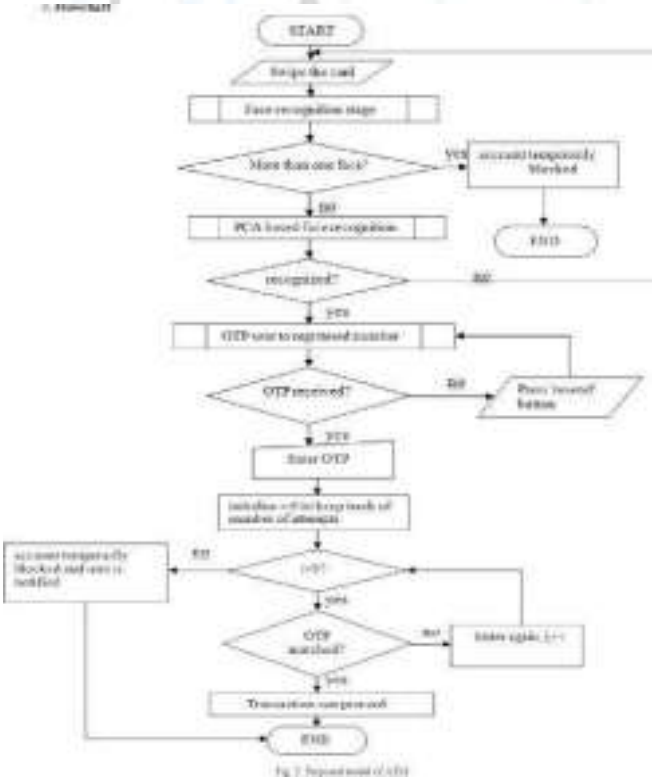

Fig 3.2.2 Flowchat of ATM Operation

3.2.5 Software Output:

V. CONCLUSION

A Raspberry Pi-based ATM security system offers a cost-effective and customizable solution for enhancing the safety and integrity of automated teller machines. Its compact size, high processing power, and connectivity options enable real-time monitoring and robust security measures. The system's ability to support remote management and scalability across multiple ATM

locations adds to its appeal. However, it is essential to acknowledge that security is paramount in the context of ATMs. Implementing such a system should be done in accordance with industry best practices and regulatory standards to ensure the highest level of security and reliability, safeguarding both the financial institution and its customers. Careful planning, thorough testing, and ongoing maintenance are key to a successful Raspberry Pi-based ATM security system.

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Home automation using raspberry pi with voice control and mobile phone control

Hardik Kadam , Shubham Magar , Sahil Mhatre

Guided by :- Prof. Aboli Khedkar

***Abstract*:- The concept is to use voice to control home equipment. There are numerous devices on the market that can accomplish this. Making your own, on the other hand, is fantastic. Create a personal assistant to help you with your tasks. Your assistant is the only one who requires voice commands. The Raspberry Pi is utilized in this project, which includes setting up an Adafruit account, tying it to the IFTTT website, and integrating it to Google Assistant for voice commands. In this home automation system, items such as a light bulb, a cooling fan, and a motor are employed, all of which can be operated using Google Assistant via voice control. Here, we will install Google Assistant on the Raspberry Pi, and the Raspberry Pi will be connected to a microphone that will accept all voice orders and manage the home alliances automatically.**

I. INTRODUCTION

Today's homes require sophistication control in its different gadgets which are the basically electronic appliances. This has revolutionized the area of home automation with respect to an increased level of affordability and simplicity through the integration of home appliances with smart phone and tablet connectivity. Smart phones are already feature-perfect and can be made to communicate to any other devices in an ad hoc network with a connectivity options like Bluetooth . With the advent of mobile phones, Mobile applications development has seen a major outbreak. Utilizing the opportunity of automating tasks for a smart home, mobile phone commonly found in normal household can be joined in a temporary network inside a home with the electronic equipments. Android, by Google Inc. provides the platform for the development of the mobile applications for the Android devices Home automation system is a mobile application developed using Android targeting its vast market which will be beneficial for the masses. According to the International Data Corporation (IDC) Worldwide Quarterly Mobile Phone Automation performs an increasingly vital role in daily experience and global economy. Engineers strive to combine automated devices with mathematical and organizational tools to create complex systems for a rapidly expanding range of applications and human activities. The concept of home automation has been around since the late 1970s. But with the enhancement of technology and smart services, people's expectations have changed a lot during the course of time to perfectly turn the traditional house into smart home, and also think that what a home should do or how the services should be provided and accessed at home to became a smart home and so has the idea of home automation.

II. LITERATURE SURVEY

Home automation using Raspberry Pi is a widely explored domain, with several studies focusing on integrating voice control and mobile phone control systems. Some key aspects that researchers often emphasize include the integration of Raspberry Pi with various sensors and actuators to manage home devices efficiently. Regarding voice control, works often revolve around implementing natural language processing (NLP) techniques for seamless interaction with the home automation system. Furthermore, mobile phone control usually involves creating intuitive applications or web interfaces to allow users to monitor and control their home devices remotely. Researchers typically emphasize security protocols to safeguard these systems against potential cyber threats, given the sensitive nature of home automation. This involves implementing encryption, secure authentication mechanisms.

III. Fundamentals

Nowadays, people have smartphones with them all the time. So it makes sense to use these to control home appliances. Presented here is a home automation system using a simple Android app, which you can use to control electrical appliances with clicks or voice commands. Commands are sent via Blynk App or Google Assistant to Raspberry Pi. So you need not get up to switch on or switch off the device while watching a movie or doing some work.

IV. Objective

In this project we will design a easiest Technology to ON and OFF varies types of electrical load. it is done by using android application and Raspberry Pi. The main objective of my system is to control the electrical appliances via remote.

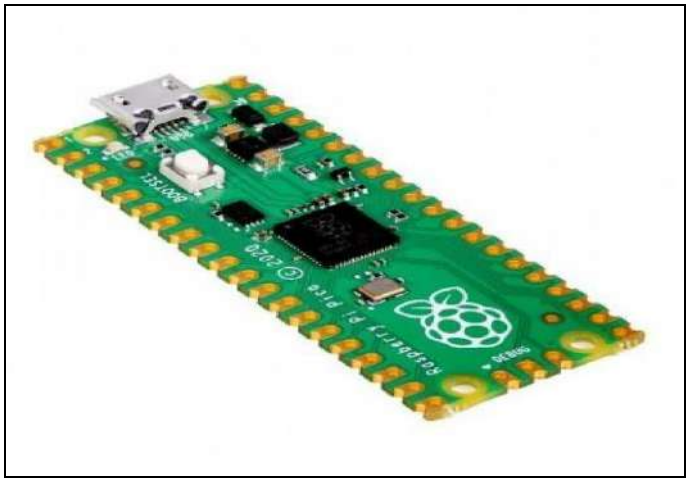

Fig 1:- Diagram of Raspberry Pi Pico w

B. . 4-Channel Relay Module

The 4 Channel Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load.

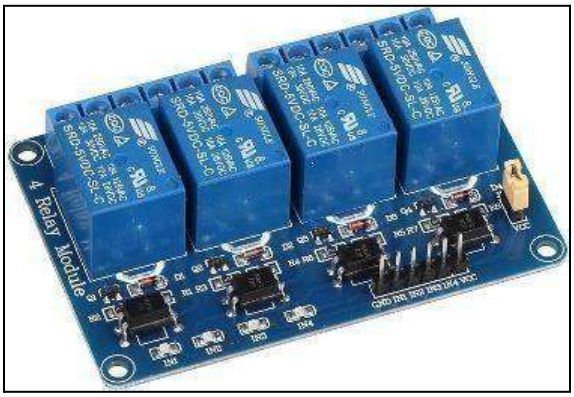

Fig 3:- 4-Channel Relay Module

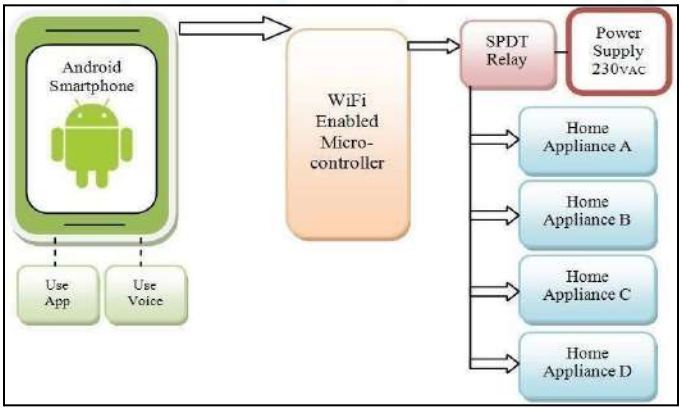

Fig 2:- Block Diagram

A. Google Assistant Integration

On Android devices, this can be done by saying "Okay, Google" or by swiping in from the bottom-left or -right corner. With an iPhone or iPad, you can tap the Google Assistant app from the home screen.

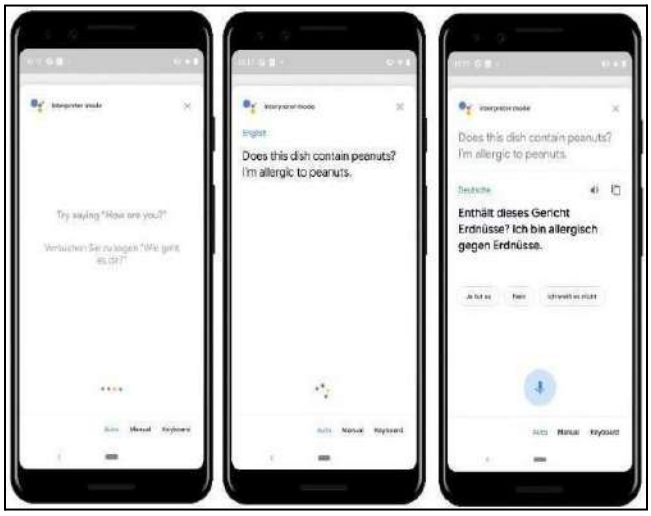

Fig 4 :- Google Assistant Integration

***C** . Blynk IoT Platform*

Blynk is an IoT platform for iOS or Android smartphones that is used to control ArduinoRaspberry Pi and Node MCU via the Internet.This application is used graphical interface.

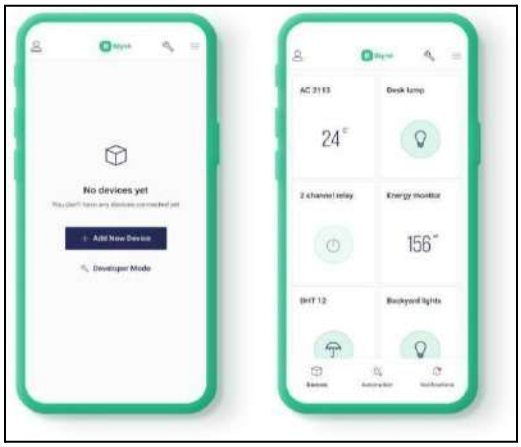

Fig 5 :- Blynk Iot Platform

VI. METHODOLOGY

Home automation using with android mobile app This project is to design and implement a cheap and open source home automation system that is capable of controlling and automating most of the house appliances. This application is an easy and manageable web interface for user to run Home Automation System. In this project we have integrated technologies like Android with Wi-Fi or bluetooth to execute Home Automation System We designed user Interfaces using Android because Android operating systems are capturing most of the mobile market. It has technical advantages of scalability, flexibility, availability, security and its ease of use for users. The aim to take Android as platform is because people are familiar as many applications are launched in Android. Android provides interactive graphical user interface which makes an application easy to use for users. We used Blynk App to link our raspeberry Pi to Relay module. Blynk App helps us to control the swtich maually through the mobile. By clicking on the switch that we have to turn on we can activate the relay remotely

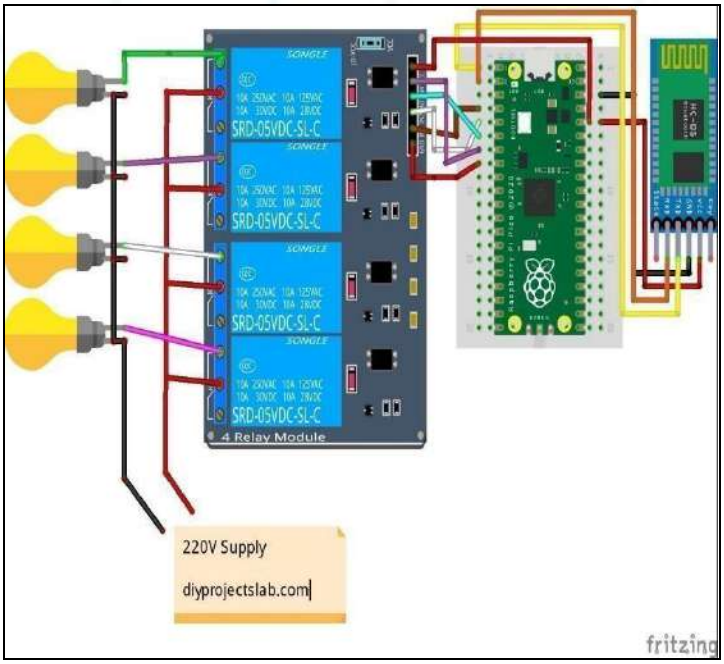

Fig 6 :- Flow CHART

VII .RESULTS

Activate Main Light Routine:-

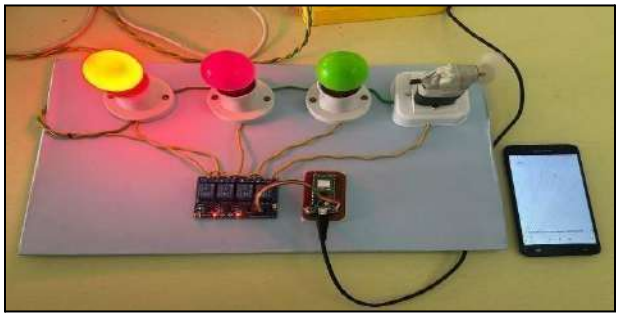

Fig 7

Activate Bedroom Light:-

Fig 8

CONCULSION

Home automation using a Raspberry Pi with voice and mobile phone control can significantly enhance the convenience and efficiency of managing household tasks. By integrating various smart devices and sensors, users can remotely control lighting, security systems, temperature, and more, using voice commands or mobile applications. This solution offers a customizable and cost-effective approach to streamline daily routines and create a more comfortable living environment.

FUTURE SCOPE

Home automation using a Raspberry Pi with voice control and mobile phone integration has immense future scope. As technology continues to advance, this field is expected to grow in several ways:

Advanced AI Integration: Future advancements will likely involve more sophisticated AI algorithms, enabling more intuitive and personalized voice control interactions.

Expanded Device Compatibility: Integration with a wider range of smart devices, appliances, and systems will become more seamless, allowing for comprehensive home management through a single platform.

Enhanced Security Features: Future systems may incorporate more robust security protocols and advanced authentication methods to ensure the safety and privacy of users' data and homes.

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Contactless Gesture Controlled Switch

Venkatesh Shetty, Omkar Vadam, Shriram Sawant, Pranay Sawane
Prof. Dr. Tusharika Banerjee

Abstract - The most common interface for interfacing with the digital world nowadays is a button. In current society, hand gestures are the most common nonverbal forms of communication that have positive importance. It is imperative to avoid touching the surface of buttons, keys, or switches that have been frequently used by others in order to prevent contracting disease. Switching technology must be improved in order to allow a contactless switch to take the place of a hand-operated switch in order to address this. Switches need to be updated to stay up with the advancement of technology. Modern homes are increasingly replacing traditional switches with centralized control systems. The main objective of our project is to develop a no-touch switch equipped with a sensor that can recognize hand gestures and translate the data into orders for light bulbs, fans, and other home appliances. Additionally, a Raspberry Pi serves as the primary control device for these contactless switches, which manage the operation of numerous home appliances.

I. Introduction

Fundamentals Switches now need to be updated with modern technology due to extended mechanical advancements. The next phase is a non-contactless switch that functions with sensors. Our clever contactless switch will include a sensor that can recognize hand movements and translate them into commands for lighting, fans, and other home appliances. We can build a setup function on the Raspberry Pi and initialize the sensor, establish the pin mode output, and operate the light and fan.

Objectives As technology advances, electromechanical switches remain unchanged. Here is the gesture control contact less switch to moderately update them. The gesture, which can be seen in several electronic items, is the latest fashion in the technology sector today. Since gestures are frequently used to swipe on devices without actually touching the screen, it is anticipated that this would open the way for significantly enhanced contactless switches to change traditional mechanical switches. The only input for this no-touch switch will be gestures made with the hand. This smart contactless switch has a sensor that can recognize hand movements and convert them into commands for light, fans, and various other home appliances.

The report is organized as follows: The introduction is given in Chapter 1. It describes the fundamental terms used in this project. It motivates me to study and understand the different techniques used in this work. This chapter also presents the outline of the objective of the report. Chapter 2 describes the review of the relevant various techniques in the literature systems. It describes the pros and cons of each technique. Chapter 3 presents the Theory and proposed work. It describes the major approaches used in this common in every aspect of life, including switch boards. There are a variety of home automation systems available, each with unique work. The societal and technical applications are mentioned in Chapter 4. The summary of the report is presented in Chapter 5.

In the current scenario, home automation systems are practically capabilities. Switchboards should also be updated with innovative technology. As a result, we are developing a hand-operated switch which also includes an automatic contactless switch.

capabilities. Switchboards should also be updated with innovative technology. As a result, we are developing a hand-operated switch which also includes an automatic contactless switch.

Theory Description

Users can operate appliances, gadgets, or systems with contactless gesture control switches without actually touching a switch or button. Instead, users can just wave their hands in front of a sensor or perform precise motions to turn on the switch.

These switches track hand or body movements using a variety of tools, including infrared (IR), ultrasonic, and capacitive sensors. They can be employed in a wide range of environments, including industrial, automotive, healthcare, and home automation.

The convenience that contactless gesture control switches provide is one of their key advantages. Because users don't have to contact the switch directly, there is less chance of contamination and wear and tear. A sensor module called the IR sensor can recognize gestures, proximity, and ambient light. It can be applied to many other things, such as contactless gesture control switches.

II. Existing System Architecture

The system's central element, the IR sensor, senses user hand gestures and transforms them into digital signals. The IR sensor's signals are processed by a Raspberry Pi, which also decodes the user's hand motions. The Raspberry pi is also in charge of triggering the switch or starting an event in response to the gesture. A battery or an external power source can supply the system with the electricity it needs to function. The user is given feedback via a display regarding the state of the system or the gesture that was picked up. A combination of hardware elements and software algorithms are used in this system design for a contactless gesture control switch that uses the IR sensor to detect, analyse, and initiate actions in response to hand movements.

Fig 2.1 IR Sensor

III. Proposed System Architecture

Our contactless gesture control switch will typically involve a sensor that will detect the user's hand gesture and trigger an action. An infrared sensor is a device that detects infrared radiation in its environment and outputs an electric signal. An infrared sensor can detect movement as well as to measure the heat of an object.

The Infrared Sensor can detect infrared radiation, which is invisible to our eyes IR sensor is an electronic device that emits light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detect the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. An infrared sensor includes two parts namely the emitter & the receiver (transmitter & receiver), so this is jointly called an optocoupler or a photo-coupler. Here, IR LED is used as an emitter whereas the IR photodiode is used as a receiver. This is the fundamental IR sensor working principle. It can run on a supply voltage ranging from 2.4V to 3.6V and communicates with Raspberry pi using the I2C interface.

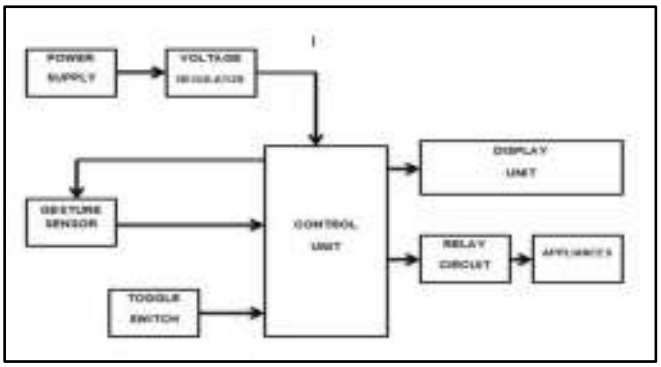

Fig 3.1 Block diagram

We'll operate a gesture control switch with a Raspberry Pi. The IR sensor will first be connected to the Raspberry Pi, and then the Raspberry Pi will need to be connected to the IR sensor using either the I2C, SPI, or GPIO pins. The software libraries that will enable us to communicate with the sensor must then be installed.

For instance, to communicate with the IR sensor, we will use the Adafruit library. We'll create a Python script that, using the software libraries and GPIO pins, will recognise the gesture and activate the switch. The GPIO library, for instance, can be used to command a relay module that will turn on or off a connected device. The script can be tested and improved as necessary after it has been written. To make the gesture sensor more responsive, it could be necessary to modify the coding or increase the sensor's sensitivity.

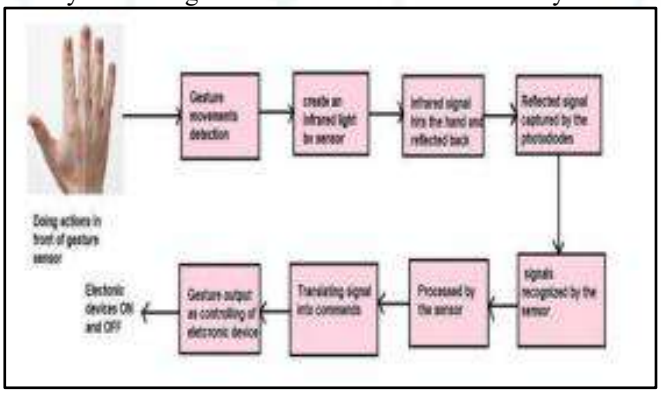

Fig 3.2 Working

Once the circuit is turned on, the Raspberry pi loads the necessary libraries. The Sparkfun Library is used to operate the gesture sensor. The user must press the switch to activate the automation system. By providing LOW logic to the Raspberry Pi pins that connect the relays, the appliances are first switched off. The user can swipe through the appliances by hovering a finger left or right over the gesture module once the LCD module has displayed a list of the first few messages. By providing LOW logic to the Raspberry Pi pin that is connected to the relay controlling the appliance, the selected appliance is turned off when the finger is moved upward.

The chosen appliance is turned on by lowering the finger. Turning the appliance on by applying HIGH logic to the Raspberry pi pin that is attached to the relay.

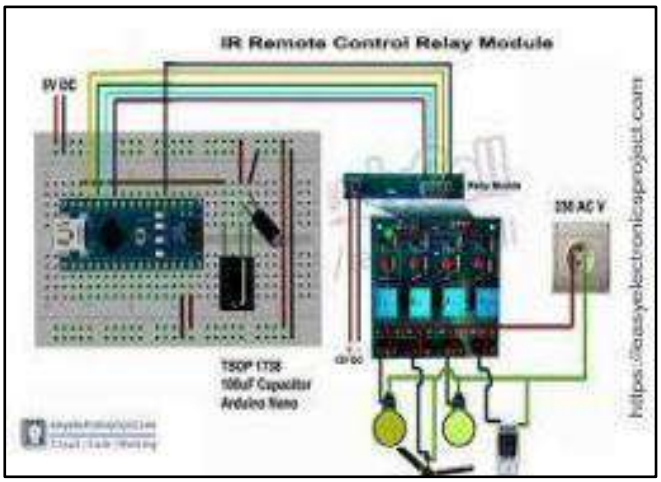

Fig 3.3 Circuit Diagram

1. Raspberry pi Zero

Fig 3.4 Raspberry pi

The Raspberry Pi launched in 2012, and there have been several iterations and variations released since then. The original Pi had a single-core 700MHz CPU and just 256MB RAM, and the latest model has a quad-core CPU clocking in at over 1.5GHz, and 4GB RAM.

2. Relay module

Fig 2.5 Relay Module

Relay modules are simply circuit boards that house one or more relays. They come in a variety of shapes and sizes, but are most commonly rectangular with 2, 4, or 8 relays mounted on them, sometimes even up to 16 relays.

Simulation

Fig 3.1 Stimulation

Output

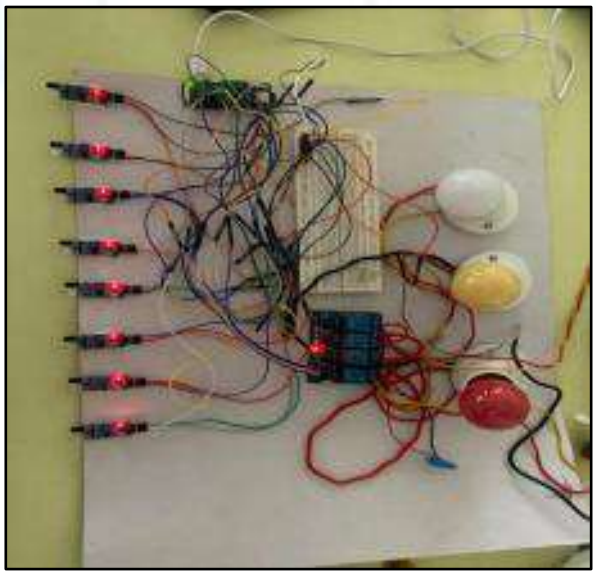

Fig 3.2 Output

Gesture control switches can be used to make devices and appliances more accessible to people with physical disabilities. For example, people with limited mobility can use hand gestures to control their electronic devices without having to rely on physical buttons or switches.

Gesture control switches can be used in public spaces to control lights, music, and other environmental factors. For example, in a museum or art gallery, visitors can use hand gestures to control the lighting and audio-visual displays.

Gesture control switches can be used in classrooms to control presentations, interactive whiteboards, and other teaching aids. Teachers can use hand gestures to navigate through slides and control the content being displayed.

IV. Technical applications

Gesture control switches can be used to control various home appliances such as lights, fans, and air conditioners. For example, by waving your hand, you can turn on or off a light or adjust the temperature of an air conditioner.

Gesture control switches can be used in cars to control various features such as music, temperature, and windows. For example, a driver can adjust the volume of the music system by swiping their hand in the air

Gesture control switches can be used in industrial settings to control machinery and equipment. For example, a factory worker can use hand gestures to control a robotic arm.

V. Summary

Users can operate systems or devices without physically touching them by using gesture control switches, a sort of user interface technology. Instead, users can control the devices by performing airborne hand movements that are recognised by sensors as orders. There are different types of gesture control switches, including camera-based systems, infrared sensors, and radar-based sensors. Each of these technologies has its strengths and limitations, and the choice of the appropriate technology depends on the specific application and user requirements.
Overall, gesture control switches represent a promising technology that has the potential to revolutionize the way we interact with devices and systems in the future.

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Enhancing Knock Sensor Security System

Namrata Deshpande, Siddhesh Yajjala, Snehal Mali, Prof by Sweta Waghmare

Abstract - This research focuses on the augmentation of knock sensor security systems through the integration of advanced piezoelectric transducer technology. Aimed at bolstering security measures in critical environments such as banks, shops, and similar establishments, the proposed enhancement leverages the unique properties of piezoelectric materials to detect and analyze acoustic signals associated with forced entry attempts.The research methodology involves the design, development, and testing of a prototype knock sensor system that incorporates piezoelectric transducers. Through extensive experimentation and analysis, the study assesses the system's ability to accurately differentiate between normal environmental noises and suspicious knocking patterns associated with illicit activities.The outcomes of this research offer a promising avenue for advancing the security infrastructure in banks, shops, and other sensitive locations. The proposed enhancements not only address the limitations of conventional knock sensors but also pave the way for a more robust and intelligent security framework. The findings have implications for the broader field of security systems, encouraging the adoption of innovative technologies to safeguard critical assets and ensure the protection of individuals and businesses alike.

Keywords - Illicit activities , Acoustic signals

I. Introduction

In the realm of modern security systems employed by banks, shops, and various commercial establishments, the knock sensor emerges as a sophisticated and reliable guardian. Like a vigilant sentry, the knock sensor employs cutting-edge technology to detect and respond to subtle vibrations or knocks, ensuring a heightened level of security. This innovative system has found its niche in safeguarding valuable assets and confidential spaces, acting as an invisible shield against unauthorized access or tampering. In this era where security is paramount, the knock sensor stands as a testament to the fusion of technology and safety, offering a proactive approach to fortifying the perimeters of financial institutions, retail outlets, and other critical environments. Let's delve into the intricacies of this intelligent security solution that has become an integral part of the defense mechanisms in our modern world.

A. Overview of the project

In recent years, the need for robust security measures in sensitive environments such as banks and shops has grown exponentially. To address this demand, the development of an advanced Knock Sensor Security System has been initiated, aiming to provide an enhanced level of protection against unauthorized access and potential threats.

Project Objectives: Improved Intruder Detection: The primary objective of the enhanced Knock Sensor Security System is to bolster intruder detection capabilities. The project focuses on refining the sensitivity and responsiveness of knock sensors to accurately differentiate between normal environmental noises and unauthorized attempts to gain access.Adaptive Machine Learning Algorithms: Leveraging the power of machine learning, the system is designed to adapt and learn from patterns over time. This feature enhances the system's ability to distinguish between authorized personnel and potential threats, making it more intelligent and dynamic in its response.Real-time Monitoring and Alerts: The project emphasizes real-time monitoring of the secured premises. Any suspicious activity triggers instant alerts, notifying security personnel through multiple communication channels. This rapid response capability is critical in preventing security breaches. Integration with Existing Security Infrastructure: Recognizing the importance of seamless integration, the enhanced Knock Sensor Security System is designed to easily integrate with existing security infrastructure. This ensures compatibility with other surveillance systems, access control mechanisms, and alarm systems already in place.User-Friendly Interface: While enhancing security, the project also focuses on maintaining user-friendliness. The interface is designed to be intuitive, allowing authorized personnel to easily manage and monitor the system. Training requirements for end-users are minimized, facilitating widespread adoption.

B. Existing System Architecture

Designing a system architecture for a knock

sensor security system involves several components and considerations. The goal of such a system is to detect unauthorized access or tampering by analyzing vibrations or knocks on doors or windows. Below is a high-level system architecture for a knock sensor security system These are the primary input devices that detect vibrations or knocks on doors and windows.The sensors should be strategically placed in key locations to cover vulnerable entry points.Receive input signals from knock sensors.Process and analyze the signals to distinguish between normal vibrations and

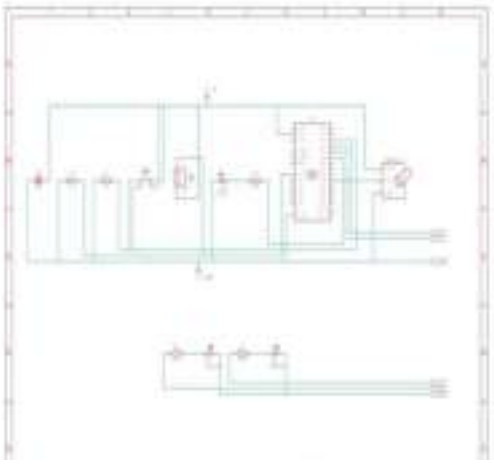

Fig 2.1Circuit diagram

II. SOFTWARE IMPLEMENTATION AND WORKING

The implementation detail is given in this section and components description.

Tinkercad is an online platform that provides a user-friendly way to create 3D designs and electronic circuits. It's particularly popular among beginners and students who are new to 3D modeling and electronics. Tinkercad can be used for various purposes, including 3D printing, prototyping, and learning about electronic.

suspicious knocks.Convert analog signals from the sensors into digital data for further processing.Implement algorithms to set thresholds for normal vibrations and identify specific patterns associated with authorized entries.Any deviation from normal patterns or surpassing predefined thresholds triggers an alert.Facilitates communication between the security system and external devices.Can use wired (e.g., Ethernet) or wireless (e.g., Wi-Fi, Bluetooth) communication protocols Manages the overall operation of the security system. scalability, ease of maintenance, and the ability to upgrade the system as technology evolves when designing

Arduino fig2.3

The arduino uno is an open-source microcontroller board based on the microchip atmega328p microcontroller. The board has 14 digital i/o pins, 6 analog i/o pins. It is programmable with the arduino ide (integrated development environment), via a type b usb cable. It can be powered by the usb cable or by an external 9-volt battery

Piezoelectric transducer fig 2.4

A piezoelectric transducer, often referred to simply as a "piezo transducer," is a device that converts mechanical energy, such as pressure or vibration, into electrical energy and vice versa. The term "piezoelectric" is derived from the Greek word "piezein," which means "to squeeze" or "to press," and "piezo," meaning "pressure." This technology is based on the piezoelectric effect.

III. RESULTS AND DISCUSSIONS

The enhancement of knock sensor security systems in establishments such as shops and banks represents a critical advancement in safeguarding valuable assets and ensuring the

overall security of these premises. The knock sensor, a device designed to detect specific patterns or vibrations associated with unauthorized attempts to gain access, plays a pivotal role in fortifying security measures. One significant result of enhancing the knock sensor security system is the heightened sensitivity and accuracy in detecting tampering or forced entry. Advanced algorithms and improved sensor technologies enable the system to distinguish between normal environmental vibrations and those indicative of illicit activities. This refinement minimizes false alarms, ensuring that security personnel can focus on genuine threats, thereby enhancing the overall effectiveness of the security infrastructure.Moreover, the integration of machine learning algorithms into the knock sensor system allows for continuous adaptation and learning from evolving threats. This dynamic capability enables the system to stay ahead of potential intruders who may attempt to exploit vulnerabilities. As a result, the security system becomes more resilient and adept at identifying emerging patterns of intrusion, providing a proactive defense mechanism.The discussion surrounding the enhancement of knock sensor security systems also includes considerations for user-friendly interfaces and seamless integration with existing security protocols. User interfaces that are intuitive and easily navigable contribute to the efficient operation of the system, empowering security personnel to respond promptly to alerts and take appropriate actions. Additionally, seamless integration with other security measures, such as CCTV cameras and access control systems, creates a comprehensive security ecosystem that bolsters overall protection.

IV. Future Scope

Custom-built enclosures with more sensors and detectors. Integration with touch screens and other interactive displays. The development of wireless technology with cloud storage and other remote management features. Mass production and commercialization of the system to cater to a wide range of customer

V. Conclusion

In conclusion, the continuous enhancement of knock sensor security systems holds tremendous potential for revolutionizing the safety and protection of critical spaces such as banks, shops, and door locks. The integration of cutting-edge technologies, including artificial intelligence, multi-modal sensors, and secure communication protocols, promises to elevate these systems to new levels of effectiveness.By incorporating AI and machine learning, knock sensors can evolve beyond simple pattern recognition, adapting to dynamic environments and distinguishing between benign and potentially malicious activities. The use of multi-modal sensors enhances the system's accuracy, ensuring reliable detection while minimizing false alarms.

Encrypted communication protocols and secure authentication mechanisms provide an additional layer of defense, safeguarding against unauthorized access and tampering.
Furthermore, the synergy between knock sensor technology and broader smart ecosystems, such as IoT, opens up avenues for seamless integration with other security devices.

This interconnected approach allows for a comprehensive security infrastructure, where a knock not only triggers lock mechanisms but also activates surveillance systems and notifies property owners in real-time.
As security threats continue to evolve, the ongoing innovation in knock sensor technology ensures adaptability and resilience against emerging challenges.

Acknowledgement

We want to express our sincere gratitude to Prof. Sweta Waghmare, who served as our project guide with unsurpassed knowledge and immense encouragement. We are grateful to Dr. Avinash Vaidya, Professor & Head of the Department, Electronics and Telecommunication Engineering, for providing us with the required facilities for the completion of the project work.

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Smart Glasses for Visually Impaired/ Blind

Atharva Ajit Parab, Mayuri Sanjay Patil

Abstract*—In this project, we present a new smart glass system for people who are blind or have low vision. Individuals with visual disabilities find it difficult to communicate effectively with their environment. The blind or visually impaired rely largely on their other senses such as hearing, touch, and smell to understand their surroundings. It is hard for them to go out alone, not to mention finding toilets, subway stations, restaurants and so on. Giving blind people great accessibility to their environment is the objective of the smart glass system. This smart glass system can see the world for them and give voice instructions and hints through wireless earphones. This smart glass system will help visually impaired people gain increased independence and freedom in city life. This report proposes a smart glass system designed to assist blind people in navigating their environment. The system consists of a pair of glasses with a camera, a Raspberry Pi and a speaker. The camera captures images of the environment, and the Raspberry Pi processes the images to identify objects and obstacles. The speakers provide voice feedback to the user, indicating the presence of an obstacle. The system uses machine learning algorithms to improve its accuracy and performance over time. The proposed system offers an affordable and practical solution to improve the mobility and independence of blind people, allowing them to navigate more confidently and safely in their surroundings. The prototype system will be based on Raspberry Pi and the application in the system is written in Python.

I. INTRODUCTION

1.1 *Fundamentals*

According to the WHO (World Health Organization) report, as of 2012 there were 285 million people estimated to be visually impaired worldwide, of which 246 million had low vision and 39 million were blind. Blind people can have difficulty interacting with their environment, because it can be hard to perceive where someone is and to get from one place to another place. Movement can become restricted, leading to having little contact with the surrounding world. The blind or visually impaired rely largely on their other senses such as hearing, touch, and smell to understand their surroundings. Blindness is often a great obstacle to their living life. It is hard for them to go out alone, not to mention finding toilets, subway stations, restaurants and so on. However, there are not many products that can help the visually impaired people. If the visually impaired people can fill the world and live life freely with the help of other devices, they will gain increased independence and freedom in their life, and this is precisely why we are going to build such a smart glass system. In this system we are going to use the Raspberry Pi to do the image processing. The camera will be attached in front of glasses, the image captured by camera is transferred and processed. When finding the public signs or images glass will give voice instructions through Bluetooth bone conduction headphones.

1.2 Objectives

Public signs in cities can act as guides for people. Following the public signs, people can find public infrastructure. So, finding and recognizing the public signs outside would help someone who is blind or visually impaired gain increased independence and roam freely in his surroundings. So, we ought to implement an application of public signs and image recognition and object recognition which helps in identifying the object present in front of the blind person in this developed smart glass system. This application will automatically detect, analyse and recognize all kinds of public signs and objects around the blind and visually impaired and give corresponding voice hints through wireless headphones. With the help of this smart glass system, the blind person may find bus stations, subway stations, restaurants, hospitals and so on.

1.3 Scope

The scope of this project is to design and develop smart glasses for visually impaired or blind people that can detect obstacles and recognise the person in the user's path and provide real-time feedback through auditory or haptic feedback. This can greatly enhance mobility and safety. Raspberry Pi is an affordable platform, making these devices more accessible to a wider range of users. The system will employ a real time object recognition algorithm and Bluetooth headphones to recognise the object and person in the user's path and give voice instructions to the user. The ultimate goal of this project is to provide social interactions more comfortable and enjoyable, quality of life for individuals with visual impairments and to help blind individuals navigate their environment safely and independently.

II. *LITERATURE SURVEY*

2.1 INTRODUCTION

This literature survey aims to provide an overview of the current state of research on the use of smart glasses for blind people. Specifically, it will examine the various types of smart glasses available, the features and functionalities they offer, and the benefits and limitations of their use. The survey will also explore the impact of smart glasses on the daily lives of blind people, including their experiences with using these devices and the challenges they face.

2.2 LITERATURE REVIEW

Low-cost Ultrasonic Smart Glasses for blinds, implemented by Nikhil Ladha, Mohit Agarwal and Rohit Das, is the device It includes a pair of glasses and obstacles detection module, processing unit and an output device. In this system a buzzer is an output

device and power are given to the central processing unit by using power supply.

Obstacle detection module consists of an ultrasonic sensor and processing unit consists of a control module, the control unit controls ultrasonic sensors and gets the information of obstacles present in front of the humans and processes the information and sends the output through buzzer. The use of ultrasonic sensors makes their device portable, low cost, lightweight and user-friendly.

The noteworthy research by Feng Lan, Guangtao Zhai and Wei Lin speaks about the implementation of Lightweight smart glass system with audio aid for visually impaired people. These smart glasses systems can see the obstacles for the blind people and give voice instructions and hints through wireless bone conduction headphones. This application can detect and recognize public signs in the cities and give corresponding noise hints to the blinds. They have made the use of the INTEL-EDISON chip to build their application and the application is written in C++ with libraries of OpenCV. INTEL EDISON breakout board is a central processing unit of the one side of the glass and intel chip is used for complex image processing. The video stream is captured by camera, and it'll be transferred to INTEL EDISON and processed into the Yocto System. When finding the public signs, the glass will give hints with voice through the bone conduction headphones.

Liang-Bi Chen, Wan-Jung Chang and Cheng-You Sie have implemented the Intelligent Assistance System for visually impaired or blind people. This is an intelligent assistance system proposed for visually blind people, which is composed of wearable smart glasses, an intelligent walking stick, mobile device application and online information platform. When blind people wear the proposed smart glasses and hold the walking stick, thus the obstacle can be detected. If visually impaired person falls then the related information (GPS), etc. will be recorded and uploaded to an online information platform (CLOUD). Related information can also be viewed by the proposed mobile device applications.

Mukhriddin Mukhiddinov and Jinsoo Cho have made the use of deep learning to develop the Smart glasses system. This Smart Glasses System using deep learning for blind/visually impaired persons is proposed by employing computer vision techniques and deep learning models, avoiding feedback and tactile graphics to facilitate independent movements in nighttime environments. The system has 4 models, A low-light image enhancement, an object-recognition, an audio feedback model, Object detection and Text-to-Speech and Tactile graphics generation model showcased at a recent conference from the California State.

University Northridge (CSUN), The great research about the AI-Enabled Smart Glasses has been done to help the Blind and Visually Impaired persons. Helen Hwang has developed the AI-Enabled Smart Glasses Helps the Blind and Visually Impaired. This Smart Glasses uses AI to organize different types of information from visual clues and verbally translates the information to the user. The wearable tech reads documents aloud, identifies acquaintances, finds missing items in the house, and helps the wearer use public transportation. The improved version incorporates several features with enhanced functionalities. Accurate text reading, Optimized Optical Character Recognition (OCR), Third Party App Integration, Ally function, Language Capabilities, Layout Detection are the extraordinary features which this system includes.

SN	Paper	Advantages and Disadvantages
1.	Nikhil Ladha, Mohit Agarwal, and Rohit Das:	Advantages: Low-cost, portable, lightweight, user-friendly. The use of ultrasonic sensors aids obstacle detection. Disadvantages: Limited details provided in the paragraph regarding specific features or challenges.
2.	Feng Lan, Guangtao Zhai, and Wei Lin:	Advantages: Lightweight smart glass system for the visually impaired, with obstacle detection and public sign recognition. Uses INTEL-EDISON for complex image processing. Disadvantages: Relies on INTEL-EDISON, which may not be the most current technology. Specific limitations and challenges not mentioned.
3.	Liang-Bi Chen, Wan-Jung Chang, and Cheng-You Sie:	Advantages: Comprehensive assistance system with smart glasses and a walking stick. Obstacle detection and fall detection with GPS tracking. Online platform for information sharing. Disadvantages: No specific disadvantages mentioned. Author not specified.
4.	Mukhriddin Mukhiddinov and Jinsoo Cho:	Advantages: Uses deep learning and computer vision for independent navigation at night. Incorporates low-light image enhancement, object recognition, audio feedback, and more. Disadvantages: Specific challenges and limitations not detailed. Author not specified.

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Public signs in cities can act as guides for people. Following the public signs, people can find public infrastructure. So, finding and recognizing the public signs outside would help someone who is blind or visually impaired gain increased independence and roam freely in his surroundings. So, we ought to implement an application of public signs and image recognition and object recognition which helps in identifying the object present in front of the blind person in this developed smart glass system. This application will automatically detect, analyse and recognize all kinds of public signs and objects around the blind and visually impaired and give corresponding voice hints through wireless headphones. With the help of this smart glass system, the blind person may find bus stations, subway stations, restaurants, hospitals and so on.

1.3 Scope

The scope of this project is to design and develop smart glasses for visually impaired or blind people that can detect obstacles and recognise the person in the user's path and provide real-time feedback through auditory or haptic feedback. This can greatly enhance mobility and safety. Raspberry Pi is an affordable platform, making these devices more accessible to a wider range of users. The system will employ a real time object recognition algorithm and Bluetooth headphones to recognise the object and person in the user's path and give voice instructions to the user. The ultimate goal of this project is to provide social interactions more comfortable and enjoyable, quality of life for individuals with visual impairments and to help blind individuals navigate their environment safely and independently.

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Block Diagram:

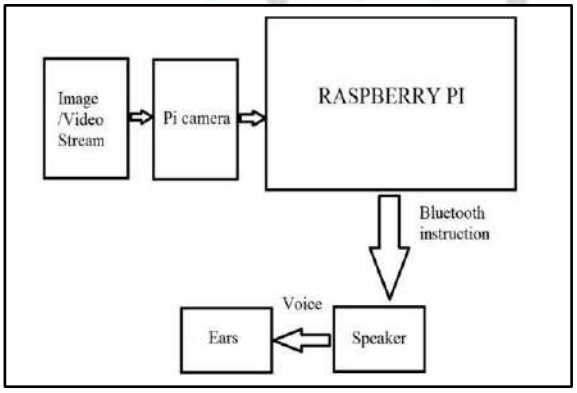

Fig. 3.2 Block diagram of Proposed System Architecture

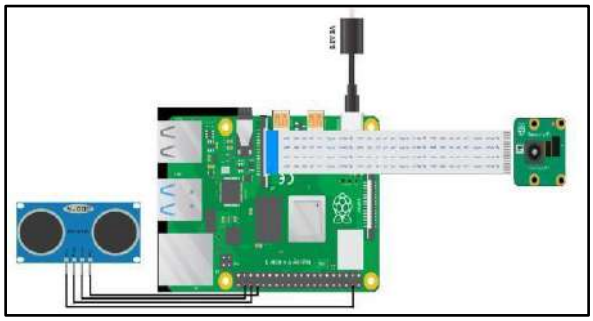

Fig. 3.3 Raspberry pi connected to pi camera and ultrasonic sensor (Circuit diagram)

3.2 Implementation Details

For this project our main requirement will be

- Raspberry Pi model 3b+ (Main board).
- Camera for face recognition.
- Wires
- Glasses
- Speaker
- Bluetooth connection.

A. Circuit Connections:

1. Raspberry Pi and Pi Camera: The Raspberry Pi connects to the Pi Camera via the Camera Serial Interface (CSI) port. The Pi Camera captures images and sends them to the Raspberry Pi for processing.

2. Raspberry Pi and Ultrasonic Sensor: The Raspberry Pi is connected to the ultrasonic sensor through GPIO pins. It triggers the sensor and receives the echo signal to measure distances. Make sure to connect the sensor's VCC and GND pins to the appropriate voltage and ground pins on the Raspberry Pi.

3. Raspberry Pi and Bluetooth Speaker: The Raspberry Pi communicates with the Bluetooth speaker wirelessly. It sends audio commands to the speaker to provide real time audio feedback to the user.

B. Functionality:

- The Pi Camera captures images of the environment.
- The ultrasonic sensor measures distances to objects in front of the user.
- The Raspberry Pi processes the images and data from the ultrasonic sensor to recognize objects and obstacles.
- When an obstacle is detected (e.g., an object is within a certain distance), the Raspberry Pi sends corresponding audio commands to the Bluetooth speaker.
- The Bluetooth speaker delivers real-time audio feedback to the user through bone conduction headphones or a speaker near the user's ears, guiding them on the presence of objects and their distances.

3.2.1 Technique

We will be using Raspberry Pi Board and python programming language to do image processing and face detection and to give voice commands. Python programming language is most used and easy to do coding language. And the use of the Raspberry Pi Board will make our system cost effective.

Raspberry Pi

Face detection using raspberry pi 4 is a faster image process and its proper identification of a face. For Raspberry Pi facial recognition, we'll utilize OpenCV and face recognition packages to train our Raspberry Pi based on a set of images that we collect and provide as our dataset. Since its launch, many open-source communities have contributed towards open-source operating systems (OS), apps and various other forms of computers which are like Raspberry Pi. Moreover, various embedded system scholars and researchers across the globe are constantly involved in the development of innovative projects using this module which is observed to have out-of-the-box application. Since its inception, Raspberry Pi is under constant up-gradation both in terms of both software and hardware which is thereby making it a "Full-Fledged Computer" with a possibility to compute intensive tasks within a specific timeframe. The use of Raspberry Pi 4 Model B will make the system cost effective. The Raspberry Pi board requires less power and has ports for camera and display.

Fig 3.4. Raspberry Pi Model 3B+

3.2.2 Code Algorithm

To recognize the person in front of the user (known or unknown) we must import 3 modules in the code: face recognition, cv2 and NumPy. We must create different arrays for known faces and their names. We must write the image file name for the face recognition of that member. Also, we will write a command to get reference to a webcam. In the next part we will try to match the face in camera video with the array of known faces. We can create any number of arrays we want. For face recognition we have to load the image file by giving its file name. And create an array of known face encodings and their names. If the face matched, then the code will run the speak synthesizer to call the name of that person using the syntax 'espeak.synth ()'. And if an unknown person comes in front of blind people, then it will also give the voice command as the unknown person is there. The espeak function is used to set different languages and voice modes to commands to be played. We can change the output language (voice commands) to Hindi and voice to different modes for example wisher mode, male voice and female voice by uncommenting lines in code.

3.2.3 Sample Dataset Used

An experiment is conducted in order to identify the known person and public signs in the user's path. Identify inputs. Specify the sample inputs that would be used in the experiments. The sample dataset used in the experiment are identified and given in Table 3.1

Dataset	**Type**
Chair	Object
Person	Individual
Public Signs	Guide and information signs

Table 3.1 Sample Dataset Used for Experiment

3.2.4 Hardware and Software Specifications

The experiment setup is carried out on a processor with image recognition technology which has the different hardware and software specifications as given in Table 3.2 and Table 3.3 respectively.

MICROPROCESSOR	RASPBERRY PI 3 B+
SENSOR	ULTRASONIC SENSOR
CAMERA	PICAMERA

Table 3.2 Hardware details

Operating System	RASPBIAN OS (RASPBERRY PI 3)
Programming Language	PYTHON
Database	PUBLIC SIGNS AND IMAGES

Table 3.3 Software details

3.2.5 Results

Hardware:

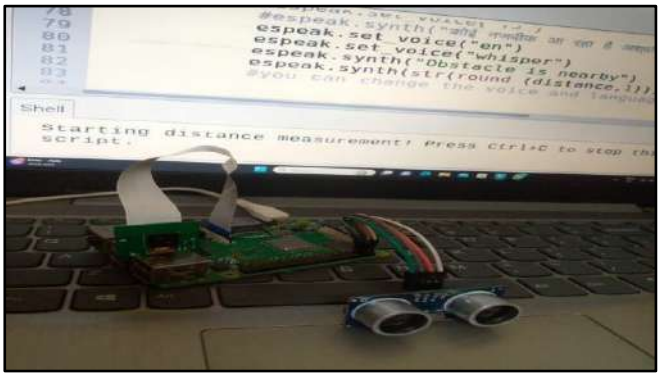

Fig 3.5 Hardware

Software:

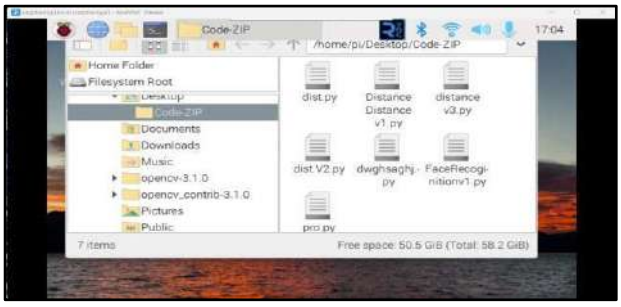

Fig 3.6 Software

IV. APPLICATIONS

Smart glasses for the blind have a wide range of applications that aim to enhance the independence and quality of life for individuals with visual impairments. Some of the key applications include:

4.1 Facial Recognition

They can recognize faces and convey information about the people the user encounters, which is valuable for social interactions.

4.2 Obstacle Detection and Navigation

Smart glasses can detect obstacles in the user's path and provide real-time feedback, enabling safer and more independent navigation, both indoors and outdoors.

4.3 Public Sign recognition

These devices can assist users in navigating complex indoor spaces like shopping malls, airports, and public toilets, etc by recognizing public signs.

4.4 Social Interaction

By identifying people through facial recognition, smart glasses can help users recognize and interact with others more confidently. Chapter 5

V. SUMMARY

In this report, the study of object recognition and detection techniques is presented. The different techniques such as content based, and collaborative filtering is explained with examples. The project offers ample room for further development and integration with emerging technologies, including artificial intelligence, cloud connectivity, and advanced sensors, to enhance the capabilities and versatility of the smart glasses for the blind. In conclusion, "Smart Glasses for Blind" using Raspberry Pi and image processing technique represents a valuable assistive technology solution, leveraging affordable hardware and sophisticated image processing to empower the visually impaired with greater autonomy and access to visual information, thereby improving their daily lives and mobility.

VI. FUTURE SCOPE

If a visually impaired person falls down then the related information like GPS, fall down message, etc will be recorded and uploaded to the online information platform.

Related information can also be viewed by the proposed mobile device application.

We can also implement this system for the real time obstacle detection. And give voice instructions to blind people when the real time objects are detected.

Smart glasses for blind will benefit from more compact, energy efficient hardware components. This will lead to more comfortable and longer-lasting devices.

Future smart glasses may incorporate haptic feedback systems to enhance the user's understanding of the environment.

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Water quality detection and Purification

Purushottam Chapali, Sanket gore, Mihir Pawar

Guided by – Mr. Yogesh Kene

Abstract: ***The integrated system for water quality detection and purification presented in this study represents a crucial advancement in ensuring access to clean and safe water. By employing a network of sensors for real-time monitoring and advanced purification technologies, the system offers a proactive approach to addressing water quality issues. The use of machine learning algorithms enhances the system's ability to detect anomalies and potential contamination events swiftly. With a user-friendly interface, stakeholders can access real-time water quality data, fostering community engagement and enabling timely responses. Field trials have validated the system's effectiveness in maintaining or restoring water quality within established safety standards. This integrated approach holds significant promise for sustainable water resource management, environmental conservation, and the protection of public health.***

I. Introduction

Now a days, quality of water has decreased because of huge expansion of industries, growth in population, excessive use of inorganic substances. Natural quality of water due to hazards of various categories is collapsed in it. Fresh and clean water limited on the Earth and it is essential resource for industry, industry, agriculture and all the creatures existing on earth

including human being. Traditional method of water quality control involves the manual collection of water sample at various locations. These water samples tested in laboratory using analytical technologies. This process is tedious that requires more time and also involves human errors. Hence there is need of developing better system to monitor the water quality parameters in real-time with avoidance of the wastage of water. The water quality parameter pH is measure of hydrogen ion concentration of solution. Pure water has 7 pH values indicate

acidity and more than 7 indicate alkalinity. The normal rage of pH is 6 to 8.5. Dissolve oxygen is one of most important indicators of water quality. It is essential for the survival of fish and other aquatic organisms. Oxygen dissolves in surface water due to aerating action of winds. It makes drinking water taste better. Turbidity is measure of the cloudiness of water. Many drinking water utilities strives to achieve levels as low as 0.1 NTU. The European standards for turbidity state that it must be no more in this project, when low level of water is detected in the overhead tank, the signal will be given to raspberry-pi that will analyse the quality of water in bottom tank. If the quality of water is good then it will be fed in the overhead tank through pump otherwise it will drain off. And when high level is reached of overhead tank then pump will turn off.an 4 NTU. World Health Organization (WHO), established that turbidity of drinking of drinking should not
be more than NTU, and should ideally be below NTU.

II. Literature Review

Jayati Bhatt, Jignesh Patoliya entitled "IOT based water quality monitoring system". Published in 2016, International Journal of Industrial Electronics and Electrical Engineering. In this paper system consist of sensors which measure the water quality parameters the measured values from the sensor are processed by microcontroller and this process values are transmitted remotely to the core controller that is raspberry-pi using Zigbee protocol sensor data can be view on internet browser application using cloud computing. Vaishnavi V. Daigvane, Dr. M. A. Gaikwad entitled "Water Quality Monitoring System Based on IOT". Published in 2017, Advances in Wireless and Mobile Communication. In this paper the system consist of several sensors is used to measuring physical and chemical parameter of water. The core controller is used in that system is Raspberry-pi. The sensor data can be viewed on Internet using Wi-Fi system. Tha.Sugapriya, S. Rakshaya et.al entitled "Smart Water Quality Monitoring System for Real Tome Application". Published in 2018, International Journal of Pure and Applied Mathematics. This system its make use of four sensor (turbidity, temperature, pH, conductivity) and the Arduino controller connected with internet of things. The processing is done by module microcontroller and the transmission module GSM. Poornima K. Keerthana M.R. and Dr. S. Sumathi entitled "Borewell Water Quality and Motor Monitoring Based IoT Gateway". Published in 2018, International Conference on Communication Computing and Internet of Things. In this paper the system consists of turbidity and pH sensor to check water quality and temperature and current sensors for motor monitor, single micro-controller chip, a Wi-Fi chip is used to send data of various bore-wells to single sever.

III. Methodology

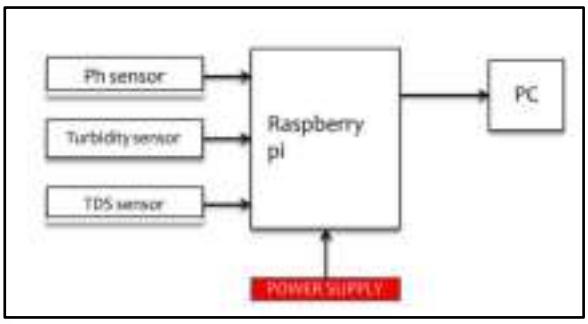

Fig: 3.1 Block diagram

This system consists of Turbidity, tds, ph. sensor Connected to raspberry pi. sensor: The water quality

parameter Ph is measure of hydrogen ion concentration of solution. Solutions with a high concentration of hydrogen ions have a low Ph and solutions with a low concentration of H+ ions have a high pH. Pure water has 7 pH values indicate acidity and more than 7 indicate alkalinity. The normal rage of Ph is 6.5 to 8.5. In drinking water if normal range of Ph doesn't maintain it causes the irritation to the eyes, skin and mucous membranes. Also causes skin disorders.

Fig 3.2 turbidity sensor

Turbidity is measure of the cloudiness of water. Many drinking water utilities strives to achieve levels as low as 0.1 NTU (Nephelometric Turbidity Unit). Nephelometry means that the light source and the photo detector are set at a 90-degree from each other. This is considered the angle most sensitive to light scatter regardless of particle size. The European standards for turbidity state that it must be no more than 4 NTU. World Health Organization (WHO), established that turbidity of drinking of drinking should not be more than NTU, and should ideally be below NTU. The goal of measuring turbidity is to get an indication for the concentration of scattering particles in water. This can be done by determination of light losses of the transmitted or the measurement of the light scattered sideways.

Fig 3.2 TDS sensor

TDS SENSOR: TDS sensors operate based on electrical conductivity. When ions are present in water, they can conduct electrical current. TDS sensors typically use two electrodes to measure the conductivity of the water. The higher the conductivity, the higher the concentration of dissolved solids. TDS sensors need to be calibrated to provide accurate measurements. Calibration is usually done using a standard solution with a known TDS value. This helps the sensor establish a baseline for accurate readings. TDS is often expressed in parts per million (ppm) or milligrams per Litre (mg/L). These units represent the mass of dissolved solids per unit volume of water.

Fig 3.3

D. Raspberry pi: The Raspberry pi-3 model B is the earliest model of the third generation Raspberry Pi. It replaces the raspberry-pi 3model B in Feb 2016.

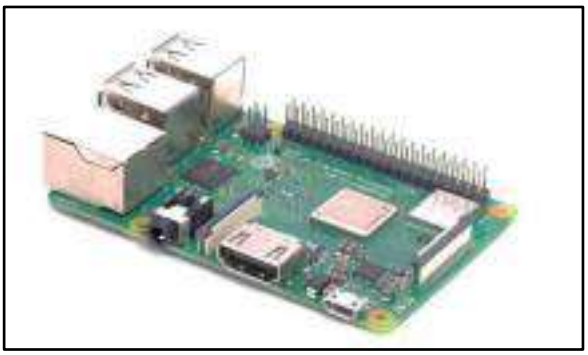

Fig 3.4 Raspberry pi

IV.Conclusion

The integrated system for water quality detection and purification represents a significant stride towards addressing the global challenge of ensuring access to clean and safe

water. The combination of advanced sensors for real-time monitoring and state-of-the-art purification technologies creates a comprehensive solution that not only identifies water quality issues promptly but also takes autonomous actions to rectify them. The incorporation of machine learning algorithms enhances the system's ability to detect anomalies, providing valuable insights for proactive decision-making. The user-friendly interface facilitates community engagement and empowers stakeholders to actively participate in maintaining water quality standards. Field trials have substantiated the effectiveness of the system in diverse environmental conditions, showcasing its potential for sustainable water resource management, environmental preservation, and the safeguarding of public health. As we face escalating water quality challenges, the integration of detection and purification technologies stands as a promising approach to secure the availability of clean water resources for current and future generations.

V. Acknowledgements

We would like to express our sincere gratitude to our mentor Mr. Yogesh Kene, Assistant Professor in Department of Electronics and Telecommunication, PCE, Panvel for his guidance, encouragement and valuable suggestion. We would also like to thank faculty of who helped us to complete our project successfully.

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Automatic Toll Tax Collection System Using RFID

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Prof. Sweta Waghmare

Abstract-An automatic toll tax system is a modernized method for collecting tolls on roads, bridges, or highways. Instead of manual collection, it uses technology like RFID (Radio-Frequency Identification) tags, cameras, and sensors to automatically identify vehicles and deduct the toll from a driver's account, often linked to a prepaid card or an online account. This system aims to improve traffic flow,reduce congestion, and enhance convenience for both toll operators and drivers. TCS is an AutomatedToll Collection System used for collecting tax automatically. In this we do the identification with the help of radio frequency. A vehicle will hold an RFID tag. This tag is nothing but a unique identification number assigned. This will be assigned by the RTO or traffic governing authority. In Accordance With This number we will

store all basic information as well as the amount he has paid in advance for the TOLL collection.

Keyword-Toll Tax, RFID

I. INTRODUCTION

An automatic toll tax system is a modernized method for collecting tolls on roads, bridges, or highways. Instead of manual collection, it uses technology like RFID (Radio Frequency Identification) tags, cameras, and sensors to automatically identify vehicles and deduct the toll from a driver's account, often linked to a prepaid card or an online account. aims to improve traffic flow, reduce congestion. operators and drivers. In essence, automatic toll tax collection systems offer a convenient and efficient way to collect tolls while improving traffic management and reducing the inconvenience associated with traditional toll booths. They represent technological advancement and its transportation infrastructure. ETC is a technology-driven solution that eliminates the need for manual toll collection, such as cash payments or ticketing. It relies on electronic tags or transponders placed in vehicles. The system consists of various components, including toll booths equipped with RFID (Radio-Frequency Identification) readers, overhead gantries, and user-side transponders or stickers. When a vehicle equipped with an ETC tag approaches a toll booth or gantry, the RFID technology reads the tag, deducts the to amount from the user's prepaid account, and opens the gate to allow seamless passage.

II. LITERATURE REVIEW

A literature review on automatic toll collection systems using RFID technology reveals several key findings and trends [1]. Improved Efficiency:RFID-based toll collection systems have been widely adopted to enhance toll booth operations. They significantly reduce traffic congestion, waiting times, and the need for manual toll collection, leading to improved traffic flow and reduced fuel consumption.[2] Cost Savings: Many studies the cost effectiveness of RFID-based toll collection systems. They require less labor and infrastructure maintenance compared to traditional toll booths, resulting in long-term cost savings for toll authorities [3].RFID Technology Advancements: The literature indicates ongoing advancements in RFID technology, including the development of more robust and secure RFID tags. These innovations aim to enhance system reliability and data security.[4]. Environmental Impact: Some studies examine the environmental benefits of RFID based toll collection, as reduced traffic congestion and idling at toll booths can lead to lower emissions and improved air quality.

III. PROBLEM STATEMENT

The main objective behind this proposal is to create a suitable automatic toll collection system to be implemented. The term suitable here refers to minimal changes in the current infrastructure with maximum increase in efficiency. The base idea behind implementing RFID based toll system is to automate the toll collection process and to reduce the manual operation in toll booths. There are two methods of collecting tax presently used as they first is the traditional manual method where one person collects money and issues a receipt. Another one is the smart card method where the e person needs to show the smart card to the system installed at the toll tax.

A) NEED:

As the electronic toll collection system is transforming manual transaction work to the automatic toll collection using RFID technology, the main objectives behind the systems are reducing the longer waiting time in the toll queue, reducing illegal toll gate entity, improving the speed and the efficiency of traffic flow, and saving the driver's time.

B) OBJECTIVE:

The objectives of implementing a toll tax collection system using RFID (Radio-Frequency Identification) technology are as follows:

1. Improve Efficiency: Streamline the toll collection process by reducing the time and congestion at toll booths, leading to smoother traffic flow.

2. Reduce Manual Labor: Minimize the need for manual toll collection, which can be time- consuming and prone to error. 3. Enhance User Experience: Provide a convenient and seamless experience for vehicle owners, reducing wait times and improving satisfaction.

4. Environmental Benefits: Reduce fuel consumption and air pollution by minimizing vehicle as per toll booth.

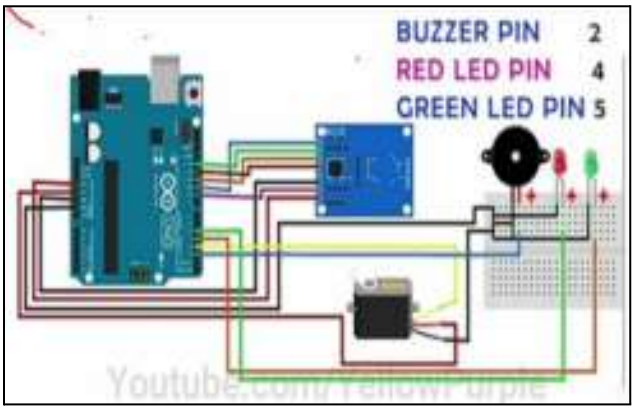

Fig 4.1 Circuit Diagram

IV. PRINCIPLE AND WORKING

The automatic toll system is interfaced with hardware mode and database to make an automatic toll collection system.

1) RFID toll tax collection system using RFID and Arduino is a type of automated toll collection system that uses radio frequency identification technology to identify and charge vehicles for using toll roads.

2) The system consists of RFIDtags that are attached to the vehicles, RFID readers that are installed at toll plazas, and Arduino microcontroller that acts as a gateway between the RFID reader and servos(gates).

3) When a vehicle passes through the RFID reader reads the RFID tag (alpha registered tag) on the car and glows the red light and the toll gate will be closed and send the data to Arduino. The Arduino uses the data to retrieve the necessary information from the central database such as the toll fee and the vehicle owner account balance.

4) In our project, theRFID reader checks if the access is enabled or not for the particular tag If the vehicle owner has sufficient balance, the Arduino deducts the toll fee from the account balance with the help of fast ag process otherwise handover money, after this completing process scan the non registered card and glow the green light and then open the toll

gate.

5) If the balance is insufficient, the Arduino denies access and alerts the vehicle owner to recharge the account. Overall, the RFID toll tax collection system using RFID and Arduino is a fast and efficient way to collect toll taxes without the need for manual intervention, leading to reduced traffic congestion and increased revenue for toll road operators.

V. COMPONENT DESCRIPTION

A) HARDWARE:

1) Arduino uno: is programmable the.Arduino ide (integrated development environment), via a type USB cable. the Arduino uno is one of the kinds of microcontroller board based on atmega328p.it can be powered by the USB cable or by an external 9-volt battery, though it accepts voltage the board has 14 digitall/o pins,6 analog I/o pins, between 7 and 20 volts.

Fig 5.1 Arduino uno

That interacts with the tags.When a reader emits radio waves, the RFID tag responds with its stored information. This technology is used in various applications, including access control, inventory management, supply chain, andmore. If you have specific questions about how RFID works or its applications, feel free to ask.

Fig 5.2 RFID Module

2) MICRO SERVO MOTOR: Servo motor works on PWM (Pulse width modulation) principle, means its angle of iotation is controlled by the duration of applied pulse to its Control PIN. Basically,servo motor is made up of DC motor which is controlled by a variable resistor (potentiometer) and some gears. High Speed force of DC motor is converted into toque by Gerais. servo motors are commonly used in various

Fig 5.3 Servo motor

applications that require precise control, such as robotics, CNC machines, automated manufacturing, and remote controlled vehicles. They are popular for their ability to provide high precision and accuracy in controlling position and motion.

3) LITHIUM ION BATTERY: Lithium-ion batteries are a type of rechargeable battery commonly used in numerous electronic devices like smartphones, laptops, electric vehicles, and more. They're popular due to their high energy density, light weight, and ability to hold a charge for extended periods compared to other types of batteries. However, they require proper handling and maintenance to prevent overheating, as well as disposal in accordance with proper recycling guidelines due to their chemical components.

Fig 5.4 Lithium-ion battery

VI. RESULTS AND DISCUSSION

1)Improved Efficiency: The RFID-based system streamlines toll collection, reducing manual intervention. Vehicles can pass through toll booths quickly, minimizing traffic congestion.

2) Accurate Toll Collection: RFID technology ensures precise toll calculation based on vehicle classification and distance travelled. Reduced errors associated with manual toll collection.

3) Reduced Labor Costs: Automation decreases the need for toll booth operators, leading to cost savings.

4) Enhanced User Experience: Users benefit from shorter wait times and a seamless payment process. Easy account management for checking balances and transaction history.

CONCLUSION

The implementation of an automatic toll-free collection system using Radio-Frequency Identification (RFID) technology offers numerous advantages, including increased efficiency, reduced traffic congestion, and improved revenue collection. In conclusion, this system not only simplifies the toll collection process but also contributes to enhanced traffic management, reduced environmental impact, and enhanced overall user experience. However, successful deployment requires careful planning, infrastructure investment, and security measures to protect user data and ensure the system's reliability. Additionally, ongoing maintenance and upgrades are essential to keep the system efficient and up-to-date with evolving technology and user needs.

VIII. FUTURE SCOPE

1) AUTOMATIC VEHICLE IDENTIFICATION- the automatic vehicle identification (AVI) component of this system refers to the technologies that determine the identification or ownership of the vehicle so that the toll will be charged to the corresponding customer.

2) VEHICLE CLASSIFICATION- vehicle type and class may have differentiated toll automated toll amount. The vehicle type may include light vehicle like the passage car or heavy vehicle like recreational vehicle. A vehicle class can be determined by the physical attributes of the vehicle, the number of occupants in the vehicle, the number of axes in the vehicle and the purpose, for which the vehicle is being used at the time of classification.

ACKNOWLEDGEMENT

The automatic toll tax collection system utilizing RFID (Radio Frequency Identification) technology has significantly improved traffic flow and efficiency on highways and roads. RFID tags, placed on vehicles, communicate with sensors at toll booths to automatically deduct toll fees as vehicles pass through, eliminating the need for manual payments or stopping. This system enhances convenience for drivers, reducing congestion and travel time. It also aids in revenue collection for road maintenance and development. However, it requires proper maintenance of RFID infrastructure and data security measures to safeguard user information collected through these systems.

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Publisher- CRC Press
Publication Year- 2008 This comprehensive handbook covers a wide range of RFID applications, including Transportation and toll collection system.

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